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Encyclopaedia Britannica;

OR, A

DICTIONARY

OF

ARTS, SCIENCES, AND MISCELLANEOUS LITERATURE;

ENLARGED AND IMPROVED.

THE FOURTH EDITION.

Illustrated with nearly six hundred Engravings.

VOL. XVI.

INDOCTI DISCANT; AMENT MEMINISSE PERITI.

EDINBURGH:
Printed by Andrew Bell, the Proprietor,
FOR ARCHIBALD CONSTABLE AND COMPANY, EDINBURGH;
AND FOR VERNOR, HOOD, AND SHARPE,
LONDON.

1810.

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ENCYCLOPÆDIA BRITANNICA.

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PARTHIA, a celebrated empire of antiquity, bounded on the weſt by Media, on the north by Hyrcania, on the eaſt by Aria, on the ſouth by Carmania the deſert; ſurrounded on every ſide by mountains, which ſtill ſerve as a boundary, though its name is now changed, having obtained that of *Eyrac* or *Arac;* and, to diſtinguiſh it from Chaldæa, that of *Eyrac Agami.* By Ptolemy it is divided into five diſtricts, viz. Caminſine, or Gamiſene, Partheyne, Choroane, Atticene, and Tabiene. The ancient geographers enumerate a great many cities in this country. Ptolemy in particular reckons 25 large cities; and it certainly muſt have been very populous, ſince we have accounts of 2000 villages, beſides a number of cities, in this diſtrict, being deſtroyed by earthquakes. Its capital was named *Hecatompolis*, from the circumſtance of its having 100 gates. It was a noble and magnificent place; and, according to ſome, it ſtill remains under the name of *Iſpahan*, the capital of the preſent Perſian empire.

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2
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opled.

Parthia is by ſome ſuppoſed to have been firſt peopled by the Phetri or Pathri, often mentioned in Scripture, and that the Parthians are deſcended from Pathruſim the ſon of Miſraim. But however true this may be with regard to the ancient inhabitants, yet it is certain, that thoſe Parthians who were ſo famous in hiſtory, deſcended from the Scythians, though from what tribe we are not certainly informed.

3
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Par-
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eus.

The hiſtory of the ancient Parthians is totally loſt. All that we know about them is, that they were firſt ſubject to the Medes, afterwards to the Perſians, and laſtly to Alexander the Great. After his death the province fell to Seleucus Nicator, and was held by him and his ſucceſſors till the reign of Antiochus Theus, about the year 250 before Chriſt. At this time the Parthians revolted, and choſe one Arſaces for their king. The immediate cauſe of this revolt was the lewdneſs of Agathocles, to whom Antiochus had committed the care of all the provinces beyond the Euphrates. This man made an infamous attempt on Tiridates, a youth of great beauty; which ſo enraged his brother Arſaces, that he excited his countrymen to revolt; and before Antiochus had leiſure to attend to the rebellion, it became too powerful to be cruſhed. Seleucus Callinicus, the ſucceſſor of Antiochus Theus, attempted to reduce Arſaces; but the latter having had ſo much time to ſtrengthen himſelf, defeated and drove his antagoniſt out of the country. Seleucus, however, in a ſhort time, undertook another expedition againſt Arſaces; but was ſtill more unfortunate than he had been in the former, being not only defeated in a great battle, but taken priſoner, and died in captivity. The day on which Arſaces gained this victory was ever after obſerved among the Parthians as an extraordinary feſtival. Arſaces being thus fully eſtabliſhed in his new kingdom, reduced Hyrcania and ſome other provinces under his power; and was at laſt killed in a battle againſt Ariarathes IV. king of Cappadocia. From this prince all the other kings of Parthia took the ſurname of *Arſaces*, as thoſe of Egypt did that of *Ptolemy*, from Ptolemy Soter.

Arſaces I. was ſucceeded by his ſon Arſaces II. who, entering Media, made himſelf maſter of that country, while Antiochus the Great was engaged in a war with Ptolemy Euergetes king of Egypt. Antiochus, however, was no ſooner diſengaged from that war, than he marched with all his forces againſt Arſaces, and at firſt drove him quite out of Media. But he ſoon returned with an army of 100,000 foot and 20,000 horſe, with which he put a ſtop to the further progreſs of Antiochus; and a treaty was ſoon after concluded, in which it was agreed, that Arſaces ſhould remain maſter of Parthia and Hyrcania, upon condition of his aſſiſting him in his wars with other nations.

4
Conqueſts
of the Parthian
monarchs.

Arſaces II. was ſucceeded by his ſon Priapatius, who reigned 15 years, and left three ſons, Phraates, Mithridates, and Artabanus. Phraates, the eldeſt, ſucceeded to the throne, and reduced under his ſubjection the Mardi, who had never been conquered by any but Alexander the Great. After him, his brother Mithridates was inveſted with the regal dignity. He reduced the Bactrians, Medes, Perſians, Elymeans, and overran in a manner all the eaſt, penetrating beyond the boundaries of Alexander's conqueſts. Demetrius Nicator, who then reigned in Syria, endeavoured to recover thoſe provinces; but his army was entirely deſtroyed, and himſelf taken priſoner, in which ſtate he remained till his death; after which victory Mithridates made himſelf maſter of Babylonia and Meſopotamia, ſo that he now commanded all the provinces from between the Euphrates and the Ganges.

5
Antiochus
Sidetes deſtroyed
with his
whole army.

Mithridates died in the 37th year of his reign, and left the throne to his ſon Phrahates II. who was ſcarce ſettled in his kingdom when Antiochus Sidetes marched againſt him at the head of a numerous army, under pretence of delivering his brother Demetrius, who was ſtill in captivity. Phrahates was defeated in three pitched battles; in conſequence of which he loſt all the countries conquered by his father, and was reduced within the limits of the ancient Parthian kingdom. Antiochus did not, however, long enjoy his good fortune; for his army, on account of their number, amounting to no fewer than 400,000, being obliged to ſeparate to ſuch diſtances as prevented them, in caſe of any ſudden attack, from joining together, the inhabitants, whom they had moſt cruelly oppreſſed, taking advantage of this ſeparation, conſpired with the Parthians to deſtroy them. This was accordingly executed; and the vaſt army of Antiochus, with the monarch himſelf, were ſlaughtered in one day, ſcarce a ſingle perſon eſcaping to carry the news to Syria. Phrahates, elated with this ſucceſs, propoſed to invade Syria; but in the mean time, happening to quarrel with the Scythians, he was by them cut off with his whole army, and was ſucceeded by his uncle Artabanus.

The new king enjoyed his dignity but a very ſhort time, being, a few days after his acceſſion, killed in another battle with the Scythians. He was ſucceeded by Pacorus I. who entered into an alliance with the Romans; and he by Phrahates III. This monarch took under his protection Tigranes the ſon of Tigranes the Great, king of Armenia, gave him his daughter in marriage, and invaded the kingdom with a deſign to place the ſon on the throne of Armenia; but on the approach of Pompey he thought proper to retire, and ſoon after ſolemnly renewed the treaty with the Romans.

6
Alliance concluded with the Romans.

Phrahates was murdered by his children Mithridates and Orodes; and ſoon after the former was put to death by his brother, who thus became ſole maſter of the Parthian empire. In his reign happened the memorable war with the Romans under Craſſus. This was occaſioned not by any breach of treaty on the ſide of the Parthians, but through the ſhameful avarice of Craſſus. The whole Roman empire at that time had been divided between Cæſar, Pompey, and Craſſus; and by virtue of that partition, the eaſtern provinces had fallen to the lot of Craſſus. No ſooner was he inveſted with this dignity, than he reſolved to carry the war into Parthia, in order to enrich himſelf with the ſpoils of that people, who were then looked upon to be very wealthy. Some of the tribunes oppoſed him, as the Parthians had religiouſly obſerved the treaty; but Craſſus having, by the aſſiſtance of Pompey, carried every thing before him, left Rome in the year 55 B. C. and purſued his march to Brunduſium, where he immediately embarked his troops, though the wind blew very high; and after a difficult paſſage, where he loſt many of his ſhips, he reached the ports of Galatia.

7
Craſſus reſolves on a war with the Parthians.

8
Plunders the temple at Jeruſalem.

From Galatia Craſſus haſtened to Syria, and paſſing through Judea, plundered the temple at Jeruſalem in his way. He then marched with as great expedition as he could to the river Euphrates, which he croſſed on a bridge of boats: and, entering the Parthian dominions, began hoſtilities. As the enemy had not expected an invaſion, they were quite unprepared for reſiſtance; and therefore Craſſus overran all Meſopotamia; and if he had taken advantage of the conſternation which the Parthians were in, might have alſo reduced Babylonia. But inſtead of this, early in the autumn, he repaſſed the Euphrates, leaving only 7000 foot and 1000 horſe to garriſon the places he had reduced; and putting his army into winter quarters in Syria, gave himſelf totally up to his favourite paſſion of amaſſing money.

Early in the ſpring, the Roman general drew his forces out of their winter quarters, in order to purſue the war with vigour; but, during the winter, Orodes had collected a very numerous army, and was well prepared to oppoſe him. Before he entered upon action, however, the Parthian monarch ſent ambaſſadors to Craſſus, in order to expoſtulate with him on his injuſtice in attacking an ally of the Roman empire; but Craſſus, without attending to what they ſaid, only returned for anſwer, that "they ſhould have his anſwer at Seleucia."

Orodes, finding that a war was not to be avoided, divided his army into two bodies. One he commanded in perſon, and marched toward Armenia, in order to oppoſe the king of that country, who had raiſed a conſiderable army to aſſiſt the Romans. The other he ſent into Meſopotamia, under the command of Surena or Surenas, a moſt experienced general, by whoſe conduct all the cities which Craſſus had reduced were quickly retaken. On this ſome Roman ſoldiers who made their eſcape, and fled to the camp of Craſſus, filled the mind of his army with terror at the accounts of the number, power, and ſtrength, of the enemy. They told their fellow ſoldiers, that the Parthians were very numerous, brave, and well diſciplined; that it was impoſſible to overtake them when they fled, or eſcape them when they purſued; that their defenſive weapons were proof againſt the Roman darts, and their offenſive weapons ſo ſharp, that no buckler was proof againſt them, &c. Craſſus looked upon all this only as the effect of cowardice: but the common ſoldiers, and even many of the chief officers, were ſo diſheartened, that Caſſius, the ſame who afterwards conſpired againſt Cæſar, and moſt of the legionary tribunes, adviſed Craſſus to ſuſpend his march, and conſider better of the enterpriſe before he proceeded farther in it. But Craſſus obſtinately perſiſted in his former reſolution, being encouraged by the arrival of Artabazus king of Armenia, who brought with him 6000 horſe, and promiſed to ſend 10,000 cuiraſſiers and 30,000 foot, whenever he ſhould ſtand in need of them. At the ſame time, he adviſed him by no means to march his army through the plains of Meſopotamia, but to take his route over the mountains of Armenia. He told him, that as Armenia was a mountainous country, the enemy's cavalry, in which their main ſtrength conſiſted, would there be entirely uſeleſs; and beſides, his army would there be plentifully ſupplied with all manner of neceſſaries: whereas, if he marched by the way of Meſopotamia, he would be perpetually haraſſed by the Parthian horſe, and frequently be obliged to lead his army through ſandy deſerts, where he would be diſtreſſed for want of water and all other proviſions. This ſalutary advice, however, was rejected, and Craſſus entered Meſopotamia with an army of about 40,000 men.

9
His ſoldiers diſheartened.

The Romans had no ſooner croſſed the Euphrates, than Caſſius adviſed his general to advance to ſome of thoſe towns in which the garriſons yet remained, in order to halt and refreſh his troops: or if he did not chooſe to follow this advice, he ſaid that his beſt way would be to march along the banks of the Euphrates to Seleucia;

cia; as by this method he would prevent the Parthians from ſurrounding him, at the ſame time he would be plentifully ſupplied with proviſions from his ſhips. Of this advice Craſſus ſeemed to approve; but was diſſuaded by Abgarus king of Edeſſa, whom the Romans took for an ally, but who was in reality a traitor ſent by Surenas to bring about the deſtruction of the Roman army.

12 trayed Abga- king of ſſa.

Under the conduct of this faithleſs guide, the Romans entered a vaſt green plain divided by many rivulets. Their march proved very eaſy through this fine country; but the farther they advanced, the worſe the roads became, inſomuch that they were at laſt obliged to climb up rocky mountains, which brought them to a dry and ſandy plain, where they could neither find food to ſatisfy their hunger, nor water to quench their thirſt. Abgarus then began to be ſuſpected by the tribunes and other officers, who earneſtly entreated Craſſus not to follow him any longer, but to retreat to the mountains; at the ſame time an expreſs arrived from Artabazus, acquainting the Roman general that Orodes had invaded his dominions with a great army, and that he was obliged to keep his troops at home, in order to defend his own dominions. The ſame meſſenger adviſed Craſſus in his maſter's name to avoid by all means the barren plains, where his army would certainly periſh with hunger and fatigue, and by all means to approach Armenia, that they might join their forces againſt the common enemy. But all was to no purpoſe; Craſſus, inſtead of hearkening either to the advice of the king or his own officers, firſt flew into a violent paſſion with the meſſengers of Artabazus, and then told his troops, that they were not to expect the delights of Campania in the moſt remote parts of the world.

Thus they continued their march for ſome days croſs a deſert, the very ſight of which was ſufficient to throw them into the utmoſt deſpair; for they could not perceive, either near them or at a diſtance, the leaſt tree, plant, or brook, not ſo much as a hill, or a ſingle blade of graſs; nothing was to be ſeen all around them but huge heaps of burning ſand. The Romans had ſcarcely got through this deſert, when word was brought them by their ſcouts, that a numerous army of Parthians was advancing full march to attack them; for Abgarus, under pretence of going out on parties, had often conferred with Surenas, and concerted meaſures with him for deſtroying the Roman army. Upon this advice, which occaſioned great confuſion in the camp, the Romans being quite exhauſted and tired out with their long and troubleſome march, Craſſus drew up his men in battalia, following at firſt the advice of Caſſius, who was for extending the infantry as wide as poſſible, that they might take up the more ground, and by that means prevent the enemy from ſurrounding them: but Abgarus aſſuring the proconſul that the Parthian forces were not ſo numerous as was repreſented, he changed this diſpoſition, and believing only the man who betrayed him, drew up his troops in a ſquare, which faced every way, and had on each ſide 12 cohorts in front. Near each cohort he placed a troop of horſe to ſupport them, that they might charge with the greater ſecurity and boldneſs. Thus the whole army looked more like one phalanx than troops drawn up in manipuli, with ſpaces between them, after the Roman manner. The general himſelf commanded in the centre, his ſon in the left wing, and Caſſius in the right.

In this order they advanced to the banks of a ſmall river called the *Baliſſus*, the ſight of which was very pleaſing to the ſoldiers, who were much haraſſed with drought and exceſſive heat. Moſt of the officers were for encamping on the banks of this river, or rather rivulet, to give the troops time to refreſh themſelves after the fatigues of ſo long and painful a march; and, in the mean time, to procure certain intelligence of the number and diſpoſition of the Parthian army; but Craſſus, ſuffering himſelf to be hurried on by the inconſiderate ardour of his ſon, and the horſe he commanded, only allowed the legions to take a meal ſtanding; and before this could be done by all, he ordered them to advance, not ſlowly, and halting now and then, after the Roman manner, but as faſt as they could move, till they came in ſight of the enemy, who, contrary to their expectation, did not appear either ſo numerous or ſo terrible as they had been repreſented; but this was a ſtratagem of Surenas, who had concealed his men in convenient places, ordering them to cover their arms, leſt their brightneſs ſhould betray them, and, ſtarting up at the firſt ſignal, to attack the enemy on all ſides. The ſtratagem had the deſired effect; for Surenas no ſooner gave the ſignal, than the Parthians, riſing as it were out of the ground, with dreadful cries, and a moſt frightful noiſe, advanced againſt the Romans, who were greatly ſurpriſed and diſmayed at the ſight; and much more ſo, when the Parthians, throwing off the covering of their arms, appeared in ſhining cuiraſſes, and helmets of burniſhed ſteel, finely mounted on horſes covered all over with armour of the ſame metal. At their head appeared young Surenas, in a rich dreſs, who was the firſt who charged the enemy, endeavouring, with his pikemen, to break through the firſt ranks of the Roman army; but finding it too cloſe and impenetrable, the cohorts ſupporting each other, he fell back, and retired in a ſeeming confuſion: but the Romans were much ſurpriſed when they ſaw themſelves ſuddenly ſurrounded on all ſides, and galled with continual ſhowers of arrows. Craſſus ordered his light-armed foot and archers to advance, and charge the enemy; but they were ſoon repulſed, and forced to cover themſelves behind the heavy-armed foot. Then the Parthian horſe, advanced near the Romans, diſcharged ſhowers of arrows upon them, every one of which did execution, the legionaries being drawn up in ſuch cloſe order, that it was impoſſible for the enemy to miſs their aim. As their arrows were of an extraordinary weight, and diſcharged with incredible force and impetuoſity, nothing was proof againſt them. The two wings advanced in good order to repulſe them, but to no effect; for the Parthians ſhot their arrows with as great dexterity when their backs were turned, as when they faced the enemy; ſo that the Romans, whether they kept their ground, or purſued the flying enemy, were equally annoyed with their fatal arrows.

11 The battle of Carrhæ.

The Romans, as long as they had any hopes that the Parthians, after having ſpent their arrows, would either betake themſelves to flight, or engage them hand to hand, ſtood their ground with great reſolution and intrepidity; but when they obſerved that there were a great many camels in their rear loaded with arrows, and that thoſe who emptied their quivers wheeled about to fill

Parthia. them [illegible], they began to loſe courage, and loudly to complain of their general for ſuffering them thus to ſtand ſtill, and ſerve only as a butt to the enemy's arrows, which, they well ſaw, would not be exhauſted till they were all killed to a man. Hereupon Craſſus ordered his ſon to advance, at all adventures, and attack the enemy with 1300 horſe, 500 archers, and 8 cohorts. But the Parthians no ſooner ſaw this choice body (for it was the flower of the army) marching up againſt them, than they wheeled about, and betook themſelves, according to their cuſtom, to flight. Hereupon young Craſſus, crying out as loud as he could, *They fly before us*, puſhed on full ſpeed after them, not doubting but he ſhould gain a complete victory; but when he was at a great diſtance from the main body of the Roman army, he perceived his miſtake; for thoſe who before had fled, facing about, charged him with incredible fury. Young Craſſus ordered his troops to halt, hoping that the enemy, upon ſeeing their ſmall number, would not be afraid to come to a cloſe fight: but herein he was likewiſe greatly diſappointed; for the Parthians, contenting themſelves to oppoſe his front with their heavy-armed horſe, ſurrounded him on all ſides; and, keeping at a diſtance, diſcharged inceſſant ſhowers of arrows upon the unfortunate Romans, thus ſurrounded and pent up. The Parthian army, in wheeling about, raiſed ſo thick a duſt, that the Romans could ſcarce ſee one another, much leſs the enemy: nevertheleſs, they found themſelves wounded with arrows, though they could not perceive whence they came. In a ſhort time the place where they ſtood was all ſtrown with dead bodies.

12 Extreme diſtreſs of the Romans.

Some of the unhappy Romans finding their entrails torn, and many overcome by the exquiſite torments they ſuffered, rolled themſelves in the ſand with the arrows in their bodies, and expired in that manner. Others endeavouring to tear out by force the bearded points of the arrows, only made the wounds the larger, and increaſed their pain. Moſt of them died in this manner; and thoſe who outlived their companions were no more in a condition to act; for when young Craſſus exhorted them to march up to the enemy, ſome ſhowed him their wounded bodies, others their hands nailed to their bucklers, and ſome their feet pierced through and pinned to the ground; ſo that it was equally impoſſible for them either to attack the enemy or defend themſelves. The young commander, therefore, leaving his infantry to the mercy of the enemy, advanced at the head of the cavalry againſt their heavy-armed horſe. The thouſand Gauls whom he had brought with him from the weſt, charged the enemy with incredible boldneſs and vigour; but their lances did little execution on men armed with cuiraſſes, and horſes covered with tried armour: however, they behaved with great reſolution; for ſome of them taking hold of the enemy's ſpears, and cloſing with them, threw them off their horſes on the ground, where they lay without being able to ſtir, by reaſon of the great weight of their armour; others, diſmounting, crept under the enemy's horſes, and thruſting their ſwords into their bellies, made them throw their riders. Thus the brave Gauls fought, though greatly haraſſed with heat and thirſt, which they were not accuſtomed to bear, till moſt of their horſes were killed, and their commander dangerouſly wounded. They then thought it adviſeable to retire to their infantry, which they no ſooner joined, than the Parthians inveſted them anew, making a moſt dreadful havock of them with their arrows. In this deſperate condition, Craſſus, ſpying a riſing ground at a ſmall diſtance, led the remains of his detachment thither, with a deſign to defend himſelf in the beſt manner he could, till ſuccours ſhould be ſent him from his father. The Parthians purſued him; and having ſurrounded him in his new poſt, continued ſhowering arrows upon his men, till moſt of them were either killed or diſabled, without being able to make uſe of their arms, or give the enemy proofs of their valour.

Parthia.

Young Craſſus had two Greeks with him, who had ſettled in the city of Carrhæ. Theſe, touched with compaſſion, at ſeeing ſo brave a man reduced to ſuch ſtraits, preſſed him to retire with them to the neighbouring city of Iſchnes, which had declared for the Romans; but the young Roman rejected their propoſal with indignation, telling them, that he would rather die a thouſand times than abandon ſo many valiant men, who ſacrificed their lives for his ſake. Having returned this anſwer to his two Greek friends, he embraced and diſmiſſed them, giving them leave to retire and ſhift for themſelves in the beſt manner they could. As for himſelf, having now loſt all hopes of being relieved, and ſeeing moſt of his men and friends killed round him, he gave way to his grief; and, not being able to make uſe of his arm, which was ſhot through with a large barbed arrow, he preſented his ſide to one of his attendants, and ordered him to put an end to his unhappy life. His example was followed by Cenſorius a ſenator, by Megabacchus an experienced and brave officer, and by moſt of the nobility who ſerved under him. Five hundred common ſoldiers were taken priſoners, and the reſt cut in pieces.

13 The death of young Craſſus.

The Parthians, having thus cut off or taken the whole detachment commanded by young Craſſus, marched without delay againſt his father, who, upon the firſt advice that the enemy fled before his ſon, and were cloſely purſued by him, had taken heart, the more becauſe thoſe who had remained to make head againſt him ſeemed to abate much of their ardour, the greateſt part of them having marched with the reſt againſt his ſon. Wherefore, having encouraged his troops, he had retired to a ſmall hill in his rear, to wait there till his ſon returned from the purſuit. Young Craſſus had deſpatched frequent expreſſes to his father, to acquaint him with the danger he was in; but they had fallen into the enemy's hands, and been by them put to the ſword: only the laſt, who had eſcaped with great difficulty, arrived ſafe, and informed him that his ſon was loſt if he did not ſend him an immediate and powerful reinforcement. This news threw Craſſus into the utmoſt conſternation; a thouſand affecting thoughts roſe in his mind, and diſturbed his reaſon to ſuch a degree, that he ſcarce knew what he was doing. However, the deſire he had of ſaving his ſon, and ſo many brave Romans who were under his command, made him immediately decamp, and march to their aſſiſtance; but he was not gone far before he was met by the Parthians, who, with loud ſhouts, and ſongs of victory, gave, at a diſtance, the unhappy father notice of his misfortune. They had cut off young Craſſus's head, and, having fixed it on the point of a lance, were advancing full ſpeed to fall on the father. As they drew near, Craſſus was ſtruck with that diſmal and affecting ſight; but on this occaſion, behaved like a hero: for though he was under the deepeſt concern, he had the preſence of mind to ſtifle his grief, for fear of diſcouraging the army, and to cry out to the diſmayed troops, "This misfortune is entirely mine; the loſs of one man cannot affect the victory: Let us charge, let us fight like Romans: if you have any compaſſion for a father who has juſt now loſt a ſon whoſe valour you admired, let it appear in your rage and reſentment againſt theſe inſulting barbarians." Thus Craſſus ſtrove to reanimate his troops; but his efforts were unſucceſsful: their courage was quite ſunk, as appeared from the faint and languiſhing ſhout which they raiſed, according to cuſtom, before the action. When the ſignal was given, the Parthians, keeping to their old way of fighting, diſcharged clouds of arrows on the legionaries, without drawing near them; which did ſuch dreadful execution, that many of the Romans, to avoid the arrows, which occaſioned a long and painful death, threw themſelves, like men in deſpair, on the enemy's heavy-armed-horſe, ſeeking from their ſpears a more quick and eaſy kind of death. Thus the Parthians continued plying them inceſſantly with their arrows till night, when they left the field of battle, crying out, that they would allow the father one night to lament the death of his ſon.

14 ſtreſs of aſſus.

This was a melancholy night for the Romans. Craſſus kept himſelf concealed from the ſoldiery, lying not in the general's tent, but in the open air, and on the bare ground, with his head wrapped up in his paludamentum or military cloak; and was, in that forlorn condition, ſays Plutarch, a great example to the vulgar, of the inſtability of fortune; to the wiſe, a ſtill greater of the pernicious effects of avarice, temerity, and ambition. Octavius, one of his lieutenants, and Caſſius, approached him, and endeavoured to raiſe him up and conſole him: but, ſeeing him quite ſunk under the weight of his affliction, and deaf to all comfort, they ſummoned a council of war, compoſed of all the chief officers; wherein it was unanimouſly reſolved, that they ſhould decamp before break of day, and retire, without ſound of trumpet, to the neighbouring city of Carrhæ, which was held by a Roman garriſon. Agreeable to this reſolution, they began their march as ſoon as the council broke up; which produced dreadful outcries among the ſick and wounded, who, perceiving that they were to be abandoned to the mercy of the enemy, filled the camp with their complaints and lamentations: but their cries and tears, though very affecting, did not ſtop the march of the others, which, indeed, was very ſlow, to give the ſtragglers time to come up. There were only 300 light horſe, under the command of one Ægnatius, who purſued their march without ſtopping. Theſe arriving at Carrhæ about midnight, Ægnatius, calling to the centinels on the walls, deſired them to acquaint Coponius, governor of the place, that Craſſus had fought a great battle with the Parthians; and, without ſaying a word more, or letting him know who he was, continued his march with all poſſible expedition to the bridge of Zeugma; which he paſſed, and by that means ſaved his troops, but was much blamed for abandoning his general.

However, the meſſage he ſent to Coponius was of ſome temporary ſervice to Craſſus. For that commander, wiſely conjecturing, from the manner in which the unknown perſon had given him that intelligence, that ſome misfortune had befallen Craſſus, immediately ordered his garriſon to ſtand to their arms; and, marching out, met Craſſus, and conducted him and his army into the city: for the Parthians, though informed of his flight, did not offer to purſue him, obſerving therein the ſuperſtitious cuſtom which obtained among them and the Perſians, not to fight in the night; but when it was day, they entered the Roman camp, and having put all the wounded, to the number of 4000, to the ſword, diſperſed their cavalry all over the plain, in purſuit of the fugitives. One of Craſſus's lieutenants, named *Vargunteius*, having ſeparated in the night from the main body of the army, with four cohorts, miſſed his way, and was overtaken by the enemy; at whoſe approach he withdrew to a neighbouring hill, where he defended himſelf, with great valour, till all his men were killed, except 20, who made their way through the enemy, ſword in hand, and got ſafe to Carrhæ: but Vargunteius himſelf loſt his life on this occaſion.

15 Surenas pretends to confer with Craſſus.

In the mean time Surenas, not knowing whether Craſſus and Caſſius had retired to Carrhæ, or choſen a different route; in order to be informed of the truth, and take his meaſures accordingly, deſpatched a meſſenger, who ſpoke the Roman language, to the city of Carrhæ, enjoining him to approach the walls, and acquaint Craſſus himſelf, or Caſſius, that the Parthian general was inclined to enter into a treaty with them, and demanded a conference. Both the proconſul and his quæſtor Caſſius ſpoke from the walls with the meſſenger; and, accepting the propoſal with great joy, deſired that the time and place for an interview might be immediately agreed upon. The meſſenger withdrew, promiſing to return quickly with an anſwer from Surenas: but that general no ſooner underſtood that Craſſus and Caſſius were in Carrhæ, than he marched thither with his whole army; and, having inveſted the place, acquainted the Romans, that if they expected any favourable terms, they muſt deliver up Craſſus and Caſſius to him in chains. Hereupon a council of the chief officers being ſummoned, it was thought expedient to retire from Carrhæ that very night, and ſeek for another aſylum. It was of the utmoſt importance that none of the inhabitants of Carrhæ ſhould be acquainted with their deſign till the time of its execution; but Craſſus, whoſe whole conduct evidently ſhows that he was blinded, as Dio Caſſius obſerves, by ſome divinity, imparted the whole matter in confidence to one Andromachus, chooſing him for his guide, and relying injudiciouſly on the fidelity of a man whom he ſcarce knew. Andromachus immediately acquainted Surenas with the deſign of the Romans; promiſing at the ſame time, as the Parthians did not engage in the night, to manage matters ſo, that they ſhould not get out of his reach before daybreak. Purſuant to his promiſe, he led them through many windings and turnings, till he brought them into deep marſhy grounds, where the infantry were up to the knees in mire. Then Caſſius, ſuſpecting that their guide had led them into thoſe bogs with no good deſign, refuſed to follow him any longer; and returning to Carrhæ, took his route towards Syria, which he reached with 500 horſe. Octavius, with 5000 men under his command, being conducted by truſty guides, gained the mountains called by Plutarch and Appian *Sinnaci*, and there intrenched himſelf before break of day.

As for Craſſus, he was ſtill entangled in the marſhes, when Surenas, at the riſing of the ſun, overtook him, and inveſted him with his cavalry. The proconſul had with him four cohorts, and a ſmall body of horſe; and with theſe he gained, in ſpite of all oppoſition, the ſummit of another hill within 12 furlongs of Octavius; who ſeeing the danger that threatened his general, flew to his aſſiſtance, firſt with a ſmall number of his men, but was ſoon followed by all the reſt, who, being aſhamed of their cowardice, quitted their poſt, though very ſafe, and charging the Parthians with great fury, diſengaged Craſſus, and obliged the enemy to abandon the hill. Upon the retreat of the enemy, they formed themſelves into a hollow ſquare; and placing Craſſus in the middle, made a kind of rampart round him with their bucklers, reſolutely proteſting, that none of the enemy's arrows ſhould touch their general's body, till they were all killed fighting in his defence. Surenas, loth to let ſo fine a prey eſcape, ſurrounded the hill, as if he deſigned to make a new attack: but, finding his Parthians very backward, and not doubting but the Romans, when night came on, would purſue their march, and get out of his reach, he had recourſe again to artifice; and declared before ſome priſoners, whom he ſoon after ſet at liberty, that he was inclined to treat with the proconſul of a peace; and that it was better to come to a reconciliation with Rome, than to ſow the ſeeds of an eternal war, by ſhedding the blood of one of her generals.

Agreeable to this declaration, Surenas, as ſoon as the priſoners were releaſed, advanced towards the hill where the Romans were poſted, attended only by ſome of his officers, and, with his bow unbent, and open arms, invited Craſſus to an interview. So ſudden a change ſeemed very ſuſpicious to the proconſul; who therefore declined the interview, till he was forced, by his own ſoldiers, to intruſt his life with an enemy whoſe treachery they had all experienced; for the legionaries flocking round him, not only abuſed him in an outrageous manner, but even menaced him if he did not accept of the propoſals made him by the Parthian general. Seeing, therefore, that his troops were ready to mutiny, he began to advance, without arms or guards, towards the enemy, after having called the gods and his officers to witneſs the violence his troops offered him; and entreated all who were preſent, but eſpecially Octavius and Petronius, two of the chief commanders, for the honour of Rome their common mother, not to mention, after his death, the ſhameful behaviour of the Roman legionaries. Octavius and Petronius could not reſolve to let him go alone; but attended him down the hill, as did likewiſe ſome legionaries, keeping at a diſtance. Craſſus was met at the foot of the hill by two Greeks who, diſmounting from their horſes, ſaluted him with great reſpect; and deſired him in the Greek tongue, to ſend ſome of his attendants, who might ſatiſfy him that Surenas, and thoſe who were with him, came without arms. Hereupon Craſſus ſent two brothers, of the Roſcian family; but Surenas having cauſed them to be ſeized, advanced to the foot of the hill, mounted on a fine horſe, and attended by the chief officers of his army. Craſſus, who waited for the return of his two meſſengers, was ſurpriſed to ſee himſelf prevented by Surenas in perſon, when he leaſt expected it. The Parthian general, perceiving, as he approached Craſſus, that he was on foot, cried out, in a ſeeming ſurpriſe, "What do I ſee? a Roman general on foot, and we on horſeback! Let a horſe be brought for him immediately." "You need not be ſurpriſed (replied Craſſus): we are come only to an interview, each after the cuſtom of his country." "Very well (anſwered Surenas), there ſhall be henceforth a laſting peace between King Orodes and the people of Rome: but we muſt ſign the articles of it on the banks of the Euphrates; for you Romans do not always remember your conventions." Craſſus would have ſent for a horſe: but a very ſtately one with a golden bit, and richly capariſoned, was brought to him by a Parthian; which Surenas preſenting to him, "Accept this horſe from my hands (ſaid he), which I give you in the name of my maſter King Orodes." He had ſcarce uttered theſe words, when ſome of the king's officers, taking Craſſus by the middle, ſet him upon the horſe, which they began to whip with great violence before them in order to make him quicken his pace. Octavius, offended at this inſult, took the horſe by the bridle; Petronius and the few Romans who were preſent, ſeconded him, and flocking all round Craſſus, ſtopped his horſe. The Parthians endeavoured to repulſe them, and clear the way for the proconſul; whereupon they began to juſtle and puſh one another with great tumult and diſorder. At laſt, Octavius, drawing his ſword, killed one of the king's grooms; but, at the ſame time, another coming behind Octavius, with one blow laid him dead at his feet. Both parties fought with great reſolution, the Parthians ſtriving to carry off Craſſus, and the Romans to reſcue him out of their hands. In this ſcuffle moſt of the Romans who came to the conference were killed; and amongſt the reſt, Craſſus himſelf, but whether by a Roman or a Parthian is uncertain. 16 Craſſus killed.

Upon his death, the reſt of the army either ſurrendered to the enemy, or, diſperſing in the night, were purſued, and put to the ſword. The Romans loſt in this campaign at leaſt 30,000 men; of which 20,000 were killed, and 10,000 taken priſoners.

When the battle of Carrhæ was fought, King Orodes was in Armenia, where he had made peace with Artabazus. While the two kings were ſolemnizing their new alliance with expenſive and public feaſts, Styllaces or Syllaces, a Parthian officer, whom Surenas had ſent with the news of his late victory, and the head of Craſſus as a proof of it, arrived in the capital of Armenia. The tranſports of joy which Orodes felt at this ſight, and theſe news, are not to be expreſſed; and the lords of both kingdoms, who attended their ſovereigns, raiſed loud and repeated ſhouts of joy. Syllaces was ordered to give a more particular and diſtinct account of that memorable action; which when he had done, Orodes commanded melted gold to be poured into Craſſus's mouth; reproaching him thereby with avarice, which had been always his predominant paſſion.

17 Surenas put to death by Orodes.

Surenas did not long enjoy the pleaſure of his victory; for Orodes, jealous of his power and authority among the Parthians, ſoon after cauſed him to be put to death. Pacorus, the king's favourite ſon was put at the head of the army; and agreeably to his father's directions, invaded Syria: but he was driven out from thence with great loſs by Cicero and Caſſius, the only general who ſurvived the defeat of Craſſus. After this we find no mention of the Parthians, till the time of the civil war between Cæſar and Pompey, when the latter ſent ambaſſadors to ſolicit ſuccour againſt his rival. This Orodes was willing to grant upon condition that Syria was delivered up to him; but as Pompey would not conſent to ſuch a propoſal, the ſuccours were not only denied, but, after the battle of Pharſalia, he put Lucius Hirtius in irons, whom Pompey had again ſent to aſk aſſiſtance, or at leaſt to deſire leave to ſhelter himſelf in the Parthian dominions.

Cæſar is ſaid to have meditated a war againſt the Parthians, which in all probability would have proved fatal to them. His death delivered them from this danger.

18
r com-
menced a-
nst the
rthians
Mark
ntony.

But, not long after, the eaſtern provinces, being grievouſly oppreſſed by Mark Antony, roſe up in arms; and having killed the tax-gatherers, invited the Parthians to join them and drive out the Romans. They very readily accepted the invitation, and croſſed the Euphrates with a powerful army under the command of Pacorus, and Labienus a Roman general of Pompey's party. At firſt they met with great ſucceſs, overran all Aſia Minor, and reduced all the countries as far as the Helleſpont and the Egæan ſea, ſubduing likewiſe Phœnicia, Syria, and even Judea. They did not however long enjoy their new conqueſts: for being elated with their victories, and deſpiſing the enemy, they engaged Ventidius, Antony's lieutenant, before Labienus had time to join them, and were utterly defeated. This ſo diſheartened Labienus's army, that they all abandoned him; and he himſelf, being thus obliged to wander from place to place in diſguiſe, was at laſt taken and put to death at Cyprus. Ventidius purſuing his advantage, gained ſeveral other victories; and at laſt entirely defeated the Parthian army under Pacorus, cutting almoſt the whole of them in pieces, and the prince himſelf among the reſt.

19
orus de-
ted and
ed by
entidius.

He did not, however, purſue this laſt victory as he might have done; being afraid of giving umbrage to Antony, who had already become jealous of the great honour gained by his lieutenant. He therefore contented himſelf with reducing thoſe places in Syria and Phœnicia which the Parthians had taken in the beginning of the war, until Antony arrived to take the command of the army upon himſelf.

Orodes was almoſt diſtracted with grief on receiving the dreadful news of the loſs of his army and the death of his favourite ſon. However, when time had reſtored the uſe of his faculties, he appointed Phrahates, the eldeſt but the moſt wicked, of all his children, to ſucceed him in the kingdom, admitting him at the ſame time to a ſhare of the ſovereign authority with himſelf. The conſequence of this was, that Phrahates very ſoon attempted to poiſon his father with hemlock.

20
rodes
urdered.

But this contrary to expectation, proving a cure for the dropſy, which an exceſs of grief had brought upon the king, the unnatural ſon had him ſtifled in bed, and ſoon after not only murdered all his own brethren, who were thirty in number, but cut off all the reſt of the royal family, not ſparing even his own eldeſt ſon, leſt the diſcontented Parthians ſhould place him, as he was already of age, on the throne.

Many of the chief lords of Parthia being intimidated by the cruelty of Phrahates, retired into foreign countries: and among thoſe one Monæſes, a perſon of great diſtinction, as well as ſkill and experience in war. This man, having fled to Antony, ſoon gained his confidence, and was by him eaſily prevailed upon to engage in a war againſt his countrymen. But Phrahates juſtly dreading the conſequences of ſuch a perſon's defection, ſent a ſolemn embaſſy to invite him home on ſuch terms as he ſhould think fit to accept; which greatly provoked Antony; though he did not hinder him from returning, leſt others ſhould thereby be diſcouraged from coming over to him. He therefore diſmiſſed him with great civility, ſending ambaſſadors at the ſame time to Phrahates to treat of a peace. Thus he hoped to divert the Parthian monarch's attention from making the neceſſary preparations for war, and that he ſhould be able to fall upon him in the ſpring when he was in no condition to make reſiſtance. But herein he was greatly diſappointed; for on his arrival at the Euphrates, which he intended to paſs, and enter the Parthian dominions on that ſide, he found all the paſſes ſo well guarded, that he thought proper to enter Media with a deſign firſt to reduce that country, and then to enter Parthia.

21
Antony
betrayed by
Artabazus
king of Armenia.

This plan had been ſuggeſted to him by Artabazus king of Armenia, who in the end betrayed him; for inſtead of conducting the army the ſtraight way from Zeugma on the Euphrates, to the Araxes which parted Media from Armenia, and which was about 500 miles diſtant from the place whence he firſt ſet out, Artabazus led them over the rocks and mountains ſo far about, that the army had marched above 1000 miles before they reached the borders of Media, where they intended to begin the war. Thus they were not only greatly fatigued but had not ſufficient time, the year being far ſpent, to put in execution the deſign on which they had come. However, as Antony was impatient to get back to Cleopatra, he left behind him moſt of the baggage of the army, and 300 waggons loaded with battering rams and other military engines for ſieges; appointing Statianus, one of his lieutenants, with a body of 10,000 men, to guard them, and to bring them, by ſlower marches, after the army. With the reſt of the forces he marched more than 300 miles before the reſt, without allowing his men any reſpite till he arrived at Praaſpa or Phrahata, the capital of Media, which he immediately inveſted. But the Parthians, well knowing that he could not make any progreſs without his military machines, paſſed by his army, in order to attack Statianus; which they did with ſuch ſucceſs, that the body commanded by him were all to a man cut off, and all their military engines taken, among which was a battering ram 80 feet long.

22
Ten thouſand Romans cut off.

Antony, notwithſtanding this diſaſter, continued the ſiege of Praaſpa; but was daily haraſſed by ſallies of the garriſon from within, and the enemy's army without. At laſt he began to think of a retreat when his proviſions were almoſt exhauſted, finding it impoſſible to become maſter of the city. But as he was to march 300 miles through the enemy's country, he thought proper firſt to ſend ambaſſadors to the Parthian monarch, acquainting him that the Roman people were willing to allow him a peace, provided he would reſtore the ſtandards and priſoners taken at Carrhæ. Phrahates received the ambaſſadors, ſitting on a golden throne; and, after having bitterly inveighed againſt the avarice and unbounded ambition of the Romans, told them that he would not part with the ſtandards and priſoners; but that if Antony would immediately raiſe the ſiege of Praaſpa, he would ſuffer him to retire unmoleſted.

Antony, who was reduced to great ſtraits, no ſooner

23
Antony leaves Parthia in great diſtreſs.

received this anſwer than he broke up the ſiege, and marched towards Armenia. However, Phrahates was not ſo good as his word; for the Romans were attacked by the enemy no fewer than 18 times on their march, and were thrice in the utmoſt danger of being cut off. A famine alſo raged in the Roman army; upon which they began to deſert to the enemy; and indeed Antony would probably have been left by himſelf, had not the Parthians, in a very cruel as well as impolitic manner, murdered all thoſe who fled to them in ſight of the reſt. At laſt, after having loſt 32,000 men, and being reduced to ſuch deſpair that he was with difficulty prevented from laying violent hands on himſelf, he reached the river Araxes; when his men, finding themſelves out of the reach of the enemy, fell down on the ground, and kiſſed it with tears of joy.

Antony was no ſooner gone, than the kings of Media and Parthia quarrelled about the booty they had taken; and after various conteſts Phrahates reduced all Media and Armenia. After this, being elated with his conqueſts, he oppreſſed his ſubjects in ſuch a cruel and tyrannical manner, that a civil war took place; in which the competitors were alternately driven out and reſtored, till the year 50, when one Vologeſes, the ſon of Gortarzes, a former king, became peaceable poſſeſſor of the throne. He carried on ſome wars againſt the Romans, but with very indifferent ſucceſs, and at laſt gladly conſented to a renewal of the ancient treaties with that powerful people.

24
Parthia ſubdued by Trajan.

From this time the Parthian hiſtory affords nothing remarkable till the reign of the emperor Trajan; when the Parthian king, by name *Coſdroes*, infringed the treaty with Rome, by driving out the king of Armenia. Upon this Trajan, who was glad of any pretence to quarrel with the Parthians, immediately haſtened into Armenia. His arrival there was ſo ſudden and unexpected, that he reduced almoſt the whole country without oppoſition; and took priſoner Parthamaſiris, the king whom the Parthians had ſet up. After this he entered Meſopotamia, took the city of Niſibis, and reduced to a Roman province the whole of that wealthy country.

Early in the ſpring of the following year, Trajan, who had kept his winter quarters in Syria, took the field again; but was warmly oppoſed by Coſdroes.—He found him encamped on the banks of the Euphrates, with a deſign to diſpute his paſſage; which he did with ſuch vigour, that the emperor, after having ſeveral times attempted to ford that river, and been always repulſed with great ſlaughter, was obliged to cauſe boats to be built on the neighbouring mountains, which he privately conveyed from thence on carriages to the water ſide; and having in the night time formed a bridge with them, he paſſed his army the next day; but not without great loſs and danger, the Parthians haraſſing his men the whole time with inceſſant ſhowers of arrows, which did great execution. Having gained the oppoſite bank, he advanced boldly into Aſſyria, the Parthians flying everywhere before him, and made himſelf maſter of Arbela. Thence he purſued his march; ſubduing, with incredible rapidity, countries where the Roman ſtandard had never been before diſplayed. Babylonia, or the province of Babylon, voluntarily ſubmitted to him. The city itſelf was, after a vigorous reſiſtance, taken by ſtorm; by which means he became maſter of all Chaldea and Aſſyria, the two richeſt provinces of the Parthian empire. From Babylon he marched to Cteſiphon, the metropolis of the Parthian monarchy; which he beſieged, and at laſt reduced. But as to the particulars of theſe great conqueſts, we are quite in the dark; this expedition, however glorious to the Roman name, being rather hinted at than deſcribed, by the writers of thoſe times. While Trajan was thus making war in the heart of the enemy's country, Coſdroes, having recruited his army, marched into Meſopotamia, with a deſign to recover that country, and cut off all communication between the Roman army and Syria. On his arrival in that province, the inhabitants flocked to him from all parts; and moſt of the cities, driving out the garriſons left by Trajan, opened their gates to him. Hereupon the emperor detached Lucius and Maximus, two of his chief commanders, into Meſopotamia, to keep ſuch cities in awe as had not revolted, and to open a communication with Syria. Maximus was met by Coſdroes; and having ventured a battle, his army was entirely defeated, and himſelf killed. But Lucius being joined by Euricius and Clarius, two other commanders ſent by Trajan with freſh ſupplies, gained conſiderable advantages over the enemy, and retook the cities of Niſibis and Seleucia, which had revolted.

25
Parthanaſpates appointed king by the Roman emperor, but ſoon after driven out.

And now Trajan, ſeeing himſelf poſſeſſed of all the beſt and moſt fruitful provinces of the Parthian empire, but at the ſame time being well appriſed that he could not, without a vaſt expence, maintain his conqueſts, nor keep in ſubjection ſo fierce and warlike a people at ſuch a diſtance from Italy; reſolved to ſet over them a king of his own chooſing, who ſhould hold the crown of him and his ſucceſſors, and acknowledge them as his lords and ſovereigns. With this view he repaired to Cteſiphon; and having there aſſembled the chief men of the nation, he crowned one of the royal family, by name *Parthanaſpates*, king of Parthia, obliging all who were preſent to pay him their allegiance. He choſe Parthanaſpates, becauſe that prince had joined him at his firſt entering the Parthian dominions, conducted him with great fidelity, and ſhown on all occaſions an extraordinary attachment to the Romans. Thus the Parthians were at laſt ſubdued, and their kingdom made tributary to Rome. But they did not long continue in this ſtate of ſubjection: for they no ſooner heard of Trajan's death, which happened ſhortly after, than, taking up arms, they drove Parthanaſpates from the throne; and recalling Coſdroes, who had retired into the country of the Hyrcanians, openly revolted from Rome. Adrian, who was then commander in chief of all the forces in the eaſt, and ſoon after acknowledged emperor by the army, did not wiſh, though he was at that time in Syria with a very numerous army, to engage in a new war with the Parthians; but contented himſelf with preſerving the ancient limits of the empire, without any ambitious proſpects of further conqueſts. Therefore, in the beginning of his reign, he abandoned thoſe provinces beyond the Euphrates which Trajan had conquered; withdrew the Roman garriſons from Meſopotamia; and, for the greater ſafety of other places, made the Euphrates the boundary of, and barrier in, thoſe parts, poſting his legions along the banks of that river.

26
Unſucceſsful wars of Vologeſes with the Romans.

Coſdroes died after a long reign, and was ſucceeded by his eldeſt ſon Vologeſes: in whoſe reign the Alani breaking into Media, then ſubject to the Parthians, committed there great devaſtations; but were prevailed upon, with rich preſents ſent them by Vologeſes, to abandon that kingdom, and return home. Upon their retreat, Vologeſes, having no enemy to contend with at home, fell unexpectedly upon Armenia; ſurpriſed the legions there; and having cut them all in pieces to a man, entered Syria; defeated with great ſlaughter Attilius Cornelianus, governor of that province; and advanced without oppoſition to the neighbourhood of Antioch; putting everywhere the Romans, and thoſe who favoured them, to the ſword. Hereupon the emperor Verus, by the advice of his colleague Antoninus ſurnamed the *Philoſopher*, leaving Rome, haſtened into Syria: and having driven the Parthians out of that province, ordered Statius Priſcus to invade Armenia, and Caſſius with Martius Verus to enter the Parthian territories, and carry the war into the enemy's country. Priſcus made himſelf maſter of Artaxata; and in one campaign drove the Parthians, though not without great loſs on his ſide, quite out of Armenia. Caſſius, on the other hand, having in ſeveral encounters defeated Vologeſes, though he had an army of 400,000 men under his command, reduced, in four years time, all thoſe provinces which had formerly ſubmitted to Trajan, took Seleucia, burnt and plundered the famous cities of Babylon and Cteſiphon, with the ſtately palaces of the Parthian monarchs, and ſtruck terror into the moſt remote provinces of that great empire. On his return, he loſt above half the number of his forces by ſickneſs and famine; ſo that, after all, the Romans, as Spartianus obſerves, had no great reaſon to boaſt of their victories and conqueſts.

However, Verus, who had never ſtirred during the whole time of the war from Antioch and Daphne, took upon him the lofty titles of *Parthicus* and *Armenicus*, as if he had acquired them juſtly in the midſt of his pleaſures and debaucheries. After the revolt and death of Caſſius, Antoninus the Philoſopher repaired into Syria to ſettle the affairs of that province. On his arrival there, he was met by ambaſſadors from Vologeſes; who having recovered moſt of the provinces ſubdued by Caſſius, and being unwilling either to part with them or engage in a new war, ſolicited the emperor to confirm him in the poſſeſſion of them, promiſing to hold them of him, and to acknowledge the ſovereignty of Rome. To theſe terms Antoninus readily agreed, and a peace was accordingly concluded between the two empires; which Vologeſes did not long enjoy, being ſoon after carried off by a diſtemper, and not murdered by his own ſubjects, as we read in Conſtantinus Manaſſes, who calls him *Belegeſes*.

27 iphon en by verus.

Upon his death, Vologeſes III. the ſon of his brother Sanatruces, and grandſon of Coſdroes, was raiſed to the throne. He ſided with Niger againſt the emperor Severus: who thereupon having ſettled matters at home, marched with all his forces againſt him; and advancing to the city of Cteſiphon, whither he had retired, laid cloſe ſiege to that metropolis. Vologeſes made a moſt gallant defence: but the city, after a long ſiege, and much bloodſhed on both ſides, was at length taken by aſſault. The king's treaſures, with his wives and children, fell into the emperor's hands: but Vologeſes himſelf had the good luck to make his eſcape; which was a great diſappointment to Severus, who immediately deſpatched an expreſs to acquaint the ſenate with the ſucceſs that had attended him in his expedition againſt the only nation that was then formidable to Rome. But he had no ſooner croſſed the Euphrates than Vologeſes recovered all the provinces except Meſopotamia, which he had reduced. Theſe expeditions were chargeable to the Romans, and coſt them much blood, without reaping any advantages from them; for as they had not ſufficient forces to keep in awe the provinces they had ſubdued, the inhabitants, greatly attached to the family of Arſaces, never failed to return to their ancient obedience as ſoon as the Roman armies were withdrawn. Vologeſes was ſoon after engaged in a war ſtill more troubleſome and deſtructive, with his brother Artabanus, who, encouraged by ſome of the diſcontented nobles, attempted to rob him of the crown, and place it on his own head. Vologeſes gained ſeveral victories over his brother and rebellious ſubjects; but died before he could reſtore the empire to its former tranquillity.

Artabanus, who had a numerous army at his devotion, did not meet with any oppoſition in ſeizing the throne, vacant by the death of his brother, though Tiridates had a better title to it, as being his elder brother. He had ſcarce ſettled the affairs of his kingdom, when the emperor Caracalla, deſirous to ſignalize himſelf as ſome of his predeceſſors had done, by ſome memorable exploit againſt the Parthians, ſent a ſolemn embaſſy to him, deſiring his daughter in marriage. Artabanus, overjoyed at this propoſal, which he thought would be attended with a laſting peace between the two empires, received the ambaſſadors with all poſſible marks of honour, and readily complied with their requeſt. Soon after, Caracalla ſent a ſecond embaſſy to acquaint the king that he was coming to ſolemnize the nuptials; whereupon Artabanus went to meet him attended with the chief of the nobility and his beſt troops, all unarmed, and in moſt pompous habits: but this peaceable train no ſooner approached the Roman army, than the ſoldiers, on a ſignal given them, falling upon the king's retinue, made a moſt terrible ſlaughter of the unarmed multitude, Artabanus himſelf eſcaping with great difficulty. The treacherous Caracalla, having gained by this exploit great booty, and, as he thought, no leſs glory, wrote a long and boaſting letter to the ſenate, aſſuming the title of *Parthicus* for this piece of treachery; as he had before that of *Germanicus*, for murdering, in like manner, ſome of the German nobility.

28 Infamous treachery of the emperor Caracalla.

Artabanus, reſolving to make the Romans pay dear for their inhuman and barbarous treachery, raiſed the moſt numerous army that had ever been known in Parthia, croſſed the Euphrates, and entered Syria, putting all to fire and ſword. But Caracalla being murdered before this invaſion, Macrinus, who had ſucceeded him, met the Parthians at the head of a mighty army, compoſed of many legions, and all the auxiliaries of the ſtates of Aſia. The two armies no ſooner came in ſight of each other, but they engaged with the utmoſt fury. The battle continued two days; both Romans and Parthians fighting ſo obſtinately, that night only parted them, without any apparent advantage on either ſide; though both retired when night had put an end to the conteſt, crying, Victory, victory. The field of battle was covered all over with dead bodies, there being already above 40,000 killed, including both Romans and Parthians: nevertheleſs

29 A deſperate battle between the Parthians and Romans.

Artabanus was heard to ſay, that the battle was only begun, and that he would continue it till either the Parthians or Romans were all to a man cut in pieces. But Macrinus, being well appriſed that the king came highly enraged againſt Caracalla in particular, and dreading the conſequences which would attend the deſtruction of his army, ſent a herald to Artabanus, acquainting him with the death of Caracalla, and propoſing an alliance between the two empires. The king, underſtanding that his great enemy was dead, readily embraced the propoſals of peace and amity, upon condition that all the priſoners who had been taken by the treachery of Caracalla ſhould be immediately reſtored, and a large ſum of money paid him to defray the expences of the war.

Theſe articles being performed without delay or heſitation, Artabanus returned into Parthia, and Macrinus to Antioch.

30
The Perſians revolt, and overthrow the Parthian empire.

As Artabanus loſt on this occaſion the flower of his army, Artaxerxes, a Perſian of mean deſcent, but of great courage and experience in war, revolting from the Parthians, prevailed on his countrymen to join him, and attempt the recovery of the ſovereign power, which he ſaid they had been unjuſtly deprived of, firſt by the Macedonians, and afterwards by the Parthians, their vaſſals. Artabanus, upon the news of this revolt, marched with the whole ſtrength of his kingdom to ſuppreſs it; but being met by Artaxerxes at the head of a no leſs powerful army, a bloody battle enſued, which is ſaid to have laſted three days. At length the Parthians, though they behaved with the utmoſt bravery, and fought like men in deſpair, were forced to yield to the Perſians, who were commanded by a more experienced leader. Moſt of their troops were cut off in the flight; and the king himſelf was taken priſoner, and ſoon after put to death at Artaxerxes's order. The Parthians, having loſt in this fatal engagement both their king and their army, were forced to ſubmit to the conqueror, and become vaſſals to a nation which had been ſubject to them for the ſpace of 475 years.

For an account of the manners, cuſtoms, &c. of the ancient Parthians, ſee the article Persia.

PARTI, Partie, *Party*, or *Parted*, in *Heraldry*, is applied to a ſhield or eſcutcheon, denoting it divided or marked out into partitions.

Parti per pale, is when the ſhield is divided perpendicularly into two halves, by a cut in the middle from top to bottom.

Parti per feſs, is when the cut is acroſs the middle from ſide to ſide.

Parti per bend dexter, is when the cut comes from the upper corner of the ſhield on the right hand, and deſcends athwart to the oppoſite lower corner.

Parti per bend ſiniſter, is when the cut, coming from the upper left corner, deſcends acroſs to the oppoſite lower one.

All theſe partitions, according to M. de la Colombiere, have their origin from the cuts and bruiſes that have appeared on ſhields after engagements; and, being proofs of the dangers to which the bearers had been expoſed, they gained them eſteem: for which reaſon they were tranſmitted to poſterity, and became arms and marks of honour to their future families.

PARTIALITY. See *Self-partiality* and Prejudice.

PARTICIPLE, in *Grammar*, an adjective formed of a verb; ſo called, becauſe it participates partly of the properties of a noun, and partly of thoſe of a verb. See Grammar.

PARTICLE, in *Phyſics*, the minute part of a body, an aſſemblage of which conſtitutes all natural bodies.

In the new philoſophy, particle is often uſed in the ſame ſenſe with atom in the ancient Epicurean philoſophy, and corpuſcle in the latter. Some writers, however, diſtinguiſh them; making particle an aſſemblage or compoſition of two or more primitive and phyſically indiviſible corpuſcles or atoms; and corpuſcle, or little body, an aſſemblage or maſs of ſeveral particles or ſecondary corpuſcles. The diſtinction, however, is of little moment; and, as to moſt purpoſes of phyſics, particle may be underſtood as ſynonymous with corpuſcle. Particles are then the elements of bodies: it is the various arrangement and texture of theſe, with the difference of the coheſion, &c. that conſtitute the various kinds of bodies, hard, ſoft, liquid, dry, heavy, light, &c. The ſmalleſt particles or corpuſcles cohere, with the ſtrongeſt attractions, and always compoſe larger particles of weaker coheſion; and many of theſe cohering compoſe larger particles, whoſe vigour is ſtill weaker; and ſo on for divers ſucceſſions, till the progreſſion end in the largeſt particles, on which the operations in chemiſtry, and the colours of natural bodies, depend, and which, by cohering, compoſe bodies of ſenſible bulks.

The coheſion of the particles of matter, according to the Epicureans, was effected by hooked atoms; the Ariſtotelians thought it managed by reſt, that is, by nothing at all. But Sir Iſaac Newton ſhows it is by means of a certain power, whereby the particles mutually attract or tend towards each other, which is ſtill perhaps giving a fact without a cauſe. By this attraction of the particles he ſhows that moſt of the phenomena of the leſſer bodies are effected, as thoſe of the heavenly bodies are by the attraction of gravity. See Attraction and Coheſion.

Particle, a term in *Theology*, uſed in the Latin church for the crumbs or little pieces of conſecrated bread, called in the Greek church μεριδες. The Greeks have a particular ceremony, called των μεριδων, *of the particles*, wherein certain crumbs of bread, not conſecrated, are offered up in honour of the Virgin, St John Baptiſt, and ſeveral other ſaints. They alſo give them the name of προσφορα, *oblatio*. Gabriel archbiſhop of Philadelphia wrote a little treatiſe expreſs περι των μεριδων, wherein he endeavours to ſhow the antiquity of this ceremony, in that it is mentioned in the liturgies of St Chryſoſtom and Baſil. There has been much controverſy on this head between the reformed and catholic divines. Aubertin and Blondel explain a paſſage in the theory of Germanus patriarch of Conſtantinople, where he mentions the ceremony of the particles as in uſe in his time, in favour of the former; Meſſieurs de Port Royal conteſt the explanation; but M. Simon, in his notes on Gabriel of Philadelphia, endeavours to ſhow that the paſſage itſelf is an interpolation, not being found in the ancient copies of Germanus, Particle || Partnerſhip.

manus, and conſequently that the diſpute is very ill grounded.

Organic PARTICLES, are thoſe ſmall moving bodies which are imperceptible without the help of glaſſes; for beſides thoſe animals which are perceptible to the ſight, ſome naturaliſts reckon this exceedingly ſmall ſpecies as a ſeparate claſs, if not of animals properly ſo called, at leaſt of moving bodies, which are found in the ſemen of animals, and which cannot be ſeen without the help of the microſcope. In conſequence of theſe obſervations, different ſyſtems of generation have been propoſed concerning the ſpermatic worms of the male and the eggs of the female. In the ſecond volume of Buffon's Natural Hiſtory, ſeveral experiments are related, tending to ſhow that thoſe moving bodies which we diſcover by the help of glaſſes in the male ſemen are not real animals, but organic, lively, active, and indeſtructible molecules, which poſſeſs the property of becoming a new organized body ſimilar to that from which they were extracted. Buffon found ſuch bodies in the female as well as in the male ſemen; and he ſuppoſes that the moving bodies which he obſerved with the microſcope in infuſions of the germs of plants are likewiſe vegetable organic molecules. Needham, Wriſberg, Spalanzani, and ſeveral other writers on the animal economy, have purſued the ſame track with M. de Buffon.

Some ſuppoſe that theſe organic molecules in the ſemen anſwer no purpoſe but to excite the venereal deſire: but ſuch an opinion cannot be well founded; for eunuchs, who have no ſeminal liquor, are nevertheleſs ſubject to venereal deſire. With reſpect to the beautiful experiments which have been made with the microſcope on organic molecules, M. Bonnet, that learned and excellent obſerver of nature, remarks that they ſeem to carry us to the fartheſt verge of the ſenſible creation, did not reaſon teach us that the ſmalleſt viſible globule of ſeminal liquor is the commencement of another univerſe, which, from its infinite ſmallneſs, is beyond the reach of our beſt microſcopes.—*Animalcules*, properly ſo called, muſt not be confounded with the wonderful organic particles of Buffon. See ANIMALCULE.

PARTICLE, in *Grammar*, a denomination for all thoſe ſmall words that tie or unite others, or that expreſs the modes or manners of words. See GRAMMAR.

PARTING, in *Chemiſtry* and *Metallurgy*, an operation by which gold and ſilver are ſeparated from each other. See CHEMISTRY, and *ORES*, *Reduction of*.

PARTISAN, in the art of war, a perſon dexterous in commanding a party; who, knowing the country well, is employed in getting intelligence, or ſurpriſing the enemy's convoys, &c. The word alſo means an officer ſent out upon a party, with the command of a body of light troops, generally under the appellation of the partiſan's corps. It is alſo neceſſary that this corps ſhould be compoſed of infantry, light horſe, and huſſars.

PARTNERSHIP, is a contract among two or more perſons, to carry on a certain buſineſs, at their joint expence, and ſhare the gain or loſs which ariſes from it. Of this there are four kinds.

I. Occaſional joint trade, where two or more merchants agree to employ a certain ſum in trade, and divide the gain or loſs ſo ſoon as the adventure is brought to an iſſue. This kind of contract being generally private, the parties concerned are not liable for each other. If one of them purchaſe goods on truſt, the furniſher, who grants the credit through confidence in him alone, has no recourſe, in caſe of his inſolvency, againſt the other partners. They are only anſwerable for the ſhare of the adventure that belongs to the inſolvent partner.

Partnerſhip

If it be propoſed to carry the adventure farther than originally agreed on, any partner may withdraw his inte[illegible]; and if it cannot be ſeparated from the others, may inſiſt that the whole ſhall be brought to an iſſue.

II. Standing companies, which are generally eſtabliſhed by written contract between the parties, where the ſtock, the firm, duration, the diviſion of the gain or loſs, and other circumſtances, are inſerted.

All the partners are generally authorized to ſign by the firm of the company, though this privilege may be confined to ſome of them by particular agreement. The firm ought only to be ſubſcribed at the place where the copartnery is eſtabliſhed. If a partner has occaſion, when abſent, to write a letter relating to their affairs, he ſubſcribes his own name on account of the company. When the ſame partners carry on buſineſs at different places, they generally chooſe different firms for each. The ſignature of each partner is generally ſent to new correſpondents; and when a partner is admitted, although there be no alteration in the firm, his ſignature is tranſmitted, with an intimation of the change in the copartnery to all their correſpondents. Houſes that have been long eſtabliſhed, often retain the old firm, though all the original partners be dead or withdrawn.

The powers of each partner are, in general, diſcretionary; but they ought not to act, in matters of importance, without conſulting together, when there is an opportunity. No partner is liable to make good the loſs ariſing from his judging wrong in a caſe where he had authority to act. If he exceeds his power, and the event prove unſucceſsful, he muſt bear the loſs; but if it prove ſucceſsful, the gain belongs to the company: yet if he acquaints the company immediately of what he has done, they muſt either acquieſce therein, or leave him the chance of gain, as well as the riſk of loſs.

All debts contracted under the firm of the company are binding on the whole partners, though the money was borrowed by one of them for his private uſe, without the conſent of the reſt. And if a partner exceeds his power, the others are nevertheleſs obliged to implement his engagements; though they may render him reſponſible for his miſbehaviour.

Although the ſums to be advanced by the partners be limited by the contract, if there be a neceſſity for raiſing more money to anſwer emergencies or pay the debts of the company, the partners muſt furniſh what is neceſſary, in proportion to their ſhares.

A debt to a company is not cancelled by the private debts of the partner: and when a partner becomes inſolvent, the company is not bound for his debts beyond the extent of his ſhare.

The debts of the company are preferable, on the company's effects, to the private debts of the partners.

Partnerſhip is generally diſſolved by the death of a partner; yet, when there are more partners than two, it may, by agreement, ſubſiſt among the ſurvivors. Sometimes it is ſtipulated, that, in caſe of the death of a partner, his place ſhall be ſupplied by his ſon, or ſome other perſon condeſcended on. The contract ought to ſpecify the time and manner in which the ſurviving partners ſhall reckon with the executors of the deceaſed for his ſhare of the ſtock, and a reaſonable time allowed for that purpoſe.

When partnerſhip is diſſolved, there are often outſtanding debts that cannot be recovered for a long time, and effects that cannot eaſily be diſpoſed of. The partnerſhip, though diſſolved in other reſpects, ſtill ſubſiſts for the management of their outſtanding affairs; and the money ariſing from them is divided among the partners, or their repreſentatives, when it is recovered. But as this may protract the final ſettlement of the company's affairs to a very inconvenient length, other methods are ſometimes uſed to bring them to a concluſion, either in conſequence of the original contract, or by agreement at the time of diſſolution. Sometimes the debts and effects are ſold by auction; ſometimes they are divided among the partners; and when there are two partners, one divides them into ſhares, as equal as poſſible, and the other chooſes either ſhare he thinks beſt.

If a partner withdraws, he continues reſponſible for his former partners till it be publicly known that he hath done ſo. A deed of ſeparation, regiſtered at a public office, is ſufficient preſumption of ſuch notoriety.

III. Companies, where the buſineſs is conducted by officers. There are many companies of this kind in Britain, chiefly eſtabliſhed for purpoſes which require a larger capital than private merchants can command. The laws with reſpect to theſe companies, when not confirmed by public authority, are the ſame as the former, but the articles of their agreement uſually very different. The capital is condeſcended on; and divided into a certain number of ſhares, whereof each partner may hold one or more, but is generally reſtricted to a certain number. Any partner may transfer his ſhare; and the company muſt admit his aſſignee as a partner. The death of the partners has no effect on the company. No partner can act perſonally in the affairs of the company: but the execution of their buſineſs is intruſted to officers, for whom they are reſponſible; and, when the partners are numerous, the ſuperintendency of the officers is committed to directors choſen annually, or at other appointed times, by the partners.

IV. Companies incorporated by authority. A royal charter is neceſſary to enable a company to hold lands, to have a common ſeal, and enjoy the other privileges of a corporation. A charter is ſometimes procured, in order to limit the riſk of the partners: for, in every private company, the partners are liable for the debts, without limitation; in corporated ſocieties, they are only liable for their ſhares in the ſtock of the ſociety. The incorporation of ſocieties is ſometimes authorized by act of parliament: but this high authority is not neceſſary, unleſs for conferring excluſive privileges.

Moral and Political Philoſophy.

Mr Paley ſays, "I know of nothing upon the ſubject of partnerſhip that requires explanation, but how the profits are to be divided where one partner contributes money and the other labour, which is a common caſe.

Partnerſhip, Partridge.

"*Rule.* From the ſtock of the partnerſhip deduct the ſum advanced, and divide the remainder between the moneyed partner and the labouring partner, in the proportion of the intereſt of the money to the wages of the labour, allowing ſuch a rate of intereſt as money might be borrowed for upon the ſame ſecurity, and ſuch wages as a journeyman would require for the ſame labour and truſt.

"*Example.* A advances 1000l. but knows nothing of the buſineſs; B produces no money, but has been brought up to the buſineſs, and undertakes to conduct it. At the end of the year the ſtock and effects of the partnerſhip amount to 1200l. conſequently there are 200l. to be divided. Now nobody would lend money upon the event of the buſineſs ſucceeding, which is A's ſecurity, under 6 per cent. therefore A muſt be allowed 60l. for the intereſt of his money. B, before he engaged in the partnerſhip, earned 30l. a-year in the ſame employment: his labour, therefore, ought to be valued at 30l. and the 200l. muſt be divided between the partners in the proportion of 60 to 30; that is, A muſt receive 133l. 6s. 8d. and B 66l. 13s. 4d. If there be nothing gained, A loſes his intereſt, and B his labour, which is right. If the original ſtock be diminiſhed, by this rule B loſes only his labour as before; whereas A loſes his intereſt and part of the principal; for which eventual diſadvantage A is compenſated, by having the intereſt of his money computed at 6 per cent. in the diviſion of the profits when there is any. It is true, that the diviſion of the profit is ſeldom forgotten in the conſtitution of the partnerſhip; and is therefore commonly ſettled by expreſs agreement; but theſe agreements, to be equitable, ſhould purſue the principle of the rule here laid down. All the partners are bound by what any one of them does in the courſe of the buſineſs; for, *quoad hoc*, each partner is conſidered as an authorized agent for the reſt."

PARTRIDGE, a ſpecies of bird. See TETRAO, ORNITHOLOGY *Index*.

The partridge is ſo valuable at the table, that a great many ways of taking it have been invented by ſportſmen, all of which ſucceed from the natural folly and timidity of the animal.

The places partridges delight in moſt are corn fields, eſpecially whilſt the corn grows, for under that cover they ſhelter and breed: neither are thoſe places unfrequented by them when the corn is cut down, by reaſon of the grain they find there, eſpecially in wheat ſtubble, the height of which they delight in, being to them as a covert or ſhelter. When the wheat ſtubble is much trodden by men or beaſts, they then betake themſelves to the barley ſtubble, provided it be freſh and untrodden; and they will, in the furrows, amongſt the clots, branches, and long graſs, hide both themſelves and coveys, which are ſometimes 20 in number, nay 30, in a covey.

When the winter ſeaſon is arrived, and the ſtubble fields are ploughed up, or over-ſoiled with cattle, partridges reſort into the upland meadows, and lodge in the dead graſs, or fog, under hedges, amongſt mole hills, or under the roots of trees; ſometimes they reſort

to

tridge to coppices and underwoods, eſpecially if any corn fields are adjacent, or where there is grown broom, brakes, fern, &c.

In the harveſt time, when every field is full of men and cattle in the day time they are found in the fallow fields which are next adjoining to the corn fields, where they lie lurking till evening or morning, and then they feed among the ſheaves of corn.

When their haunts are known, according to the ſituation of the country and ſeaſon of the year, the next care muſt be to find them out in their haunts, which is done ſeveral ways. Some do it by the eye only; and this art can never be taught, but learned by frequent experience, the colour of the birds being ſo like that of the earth at a diſtance, that no eye but a very converſant one could diſtinguiſh them. When they are once ſeen, the buſineſs is to keep the eye upon them, and then to keep in continual motion. They are a very lazy bird, and by this means will let a perſon almoſt tread upon them; though if the perſon ſtands ſtill to eye them, they will riſe immediately though they be at a conſiderable diſtance.

Another method of diſcovering them is, by going to their haunts very early in the morning, or at the cloſe of the evening, which is called the *jucking* time. The noiſe of the cock partridge is to be attended to at this time, and is very loud and earneſt. The hen will ſoon come up to the cock after her making the noiſe, which ſhe does by way of anſwer; and when they are got together, their chattering will diſcover them. Thus they may always be found at theſe times. But there is yet a better method of finding this bird, which is by the *call*. The buſineſs, in order to have ſucceſs in this way, is carefully to learn the notes of the partridge, and be able to imitate all the ſeveral ſounds. When perfect in this, the perſon is to go to the haunts morning and evening, and placing himſelf in ſome place where he can ſee the birds without being ſeen by them, he is to liſten to their calling; and when they are heard, he is to anſwer in the ſame notes, doubling again as they do: by continuing this, they may be brought ſo near, that the perſon lying down on his back may count their whole number. Having in this manner found where the birds are, the next care is to catch them.

They are ſo fooliſh, that it is extremely eaſy to take them in *nets*. In order to this, there needs no more than the going out, provided with two or three nets, with meſhes ſomewhat ſmaller than thoſe of the pheaſant nets, and walking round about the covey, a net is to be fixed ſo as to draw over them, on pulling a line at a diſtance. All this may be eaſily done; for ſo long as the ſportſman continues moving about, and does not fix his eye too intently upon them, they will let him come near enough to fix the net without moving. If they lie ſo ſtraggling, that one net will not cover them, then two or three muſt be fixed in the ſame manner. The ſportſman may then draw the nets over them, and they will often lie ſtill with the nets upon them till he comes up to fright them; then they will riſe, and be entangled in the net.

A ſecond method of taking them is with *bird lime*: this is done by means of wheat ſtraws. Theſe muſt be large, and cut off between knot and knot; they muſt be well limed with the beſt and ſtrongeſt bird lime, and the ſportſman muſt carry a great number of them with him. Having found a field where there are partridges, he is to call; and if they anſwer, he is then to ſtick up the limed ſtraws in rows acroſs two or three lands, and going backward, call again to them, leading them on in the road where the ſtraws are: they will follow one another like a flock of chickens, and come out to the call; and will in their way run upon the ſtraws, and liming themſelves they will daub one another by crowding together, ſo that very few of them will be able to eſcape. Partridge.

But there is yet a pleaſanter way of taking them than this, that is, by *driving* of them. In order to this, an engine is to be made of canvaſs ſtuffed with ſtraw, to repreſent a horſe; this horſe and nets are to be taken to the haunts of the partridges, and the nets being placed ſlanting or ſlopewiſe in the lower part of the field, the ſportſman is to take the wind in his back and get above them, driving them downwards; his face is to be covered with ſomething green or blue, and placing the horſe before him, he is to go towards them ſlowly and gently; and by this means they will be raiſed on their legs, but not on their wings, and will run before the horſe into the nets. If in the way they go into a wrong path, the horſe is to be moved to face them; and they will be thus driven back again, and driven every way the ſportſman pleaſes.

The partridges of Abyſſinia, we are told, are very large, being as big as *capons*.

In Jeremiah xvii. 11. we have the following curious paſſage: "As the partridge ſitteth on *eggs*, and hatcheth *them* not; ſo he that getteth riches, and not by right, ſhall leave them in the midſt of his days, and at his end ſhall be a fool;" which is explained by Mr Poole as follows: It is no wonder if we cannot be certain as to the ſenſe of theſe words, ſo far as they concern natural hiſtory, when we are not certain what bird it is to which this doth relate. We tranſlate it *partridge*: others will have it to be a *cuckoo;* but certain it is, that it is the ſame word which we tranſlate *partridge*, (1 Sam. xxvi. 20.); and cuckoos uſe not to be much hunted after. How the partridge is ſaid to ſit on eggs and hatch them not, is yet a greater queſtion. It may be occaſioned ſo many ways, viz. either ſitting upon wind eggs; or being killed before the eggs are hatched; or having its eggs deſtroyed by the male partridge, or by ſome dog or other vermine; or, its neſt being found, having her eggs taken from her, that it is hard to determine which the prophet means. Of all others, I leaſt approve of that which Jerome makes the ſenſe, though the thing be true (if we may believe Caſſiodorus and ſeveral natural hiſtorians, Aldrovandus, &c.), that partridges have ſuch a love and deſire to hatch young ones, that having loſt their own eggs, they will ſteal the eggs of other partridges, and hatch them; which being hatched, the young ones knowing the cry of their proper dams, hearing them call, leave the partridge that hatched them (which is one thing quoted by Aldrovandus, to ſhow the ſagacity of that bird); but if this were the ſenſe, the words would be, 'as the partridge ſitteth on eggs, and hatcheth them, but enjoyeth them not;' whereas they are, 'hatcheth them not:' that is, having loſt them, either by ſome man that hath taken them from her, or by ſome vermin or wild beaſt." *Poole's Annot. in Loc.*

The

Parturition ‖ Paſcal.

The words in the original are, דגר ולא ילד קרא, which the Septuagint tranſlate ἐφώνησε πέρδιξ, &c. "The partridge cried; it gathered together what it had not produced;" and ſome tranſlate the Hebrew, "The partridge lays many eggs, but does not hatch them all." Le Clerc, upon the authority of Bocchart, underſtands the Hebrew word *kore* here to ſignify a *woodcock*. Le Clerc's tranſlation is as follows: *Ruſticula ova colligit, ſed non parit; facit ſibi divitias, ſed ſine jure, mediis ſuis diebus eas relinquit, atque ad extremum ſtulta eſt.*

PARTURITION, the act of bringing forth or being delivered of young. See MIDWIFERY.

PARTY, in a military ſenſe, a ſmall number of men, horſe, or foot, ſent upon any kind of duty; as into an enemy's country to pillage, to take priſoners, and to oblige the country to come under contribution. Parties are often ſent out to view the roads and ways, get intelligence, ſeek forage; to reconnoitre, or amuſe the enemy upon a march: they are alſo frequently ſent upon the flanks of an army or regiment, to diſcover the enemy if near, and prevent ſurpriſe or ambuſcade.

PARVICH, an iſland near Dalmatia, and one of the beſt peopled and moſt conſiderable of thoſe which are under the juriſdiction of Sibenico. It contains a great number of fiſhermen, and a conſiderable number of perſons employed in agriculture. It contains many Roman antiquities, which evidently ſhow that it was a Roman ſtation. It ſeems to be among the number of thoſe iſlands which Pliny calls *Celaduſſæ*, which is ſuppoſed to be an inverſion of δυσκέλαδος, which means *ill ſounding* or *noiſy*. Parvich is not of large extent, but it is extremely fertile. Every product ſucceeds in perfection there: we mean thoſe products of which a very ſhallow ground is ſuſceptible; ſuch as wine, oil, mulberry-trees, and fruit. The aſpect of this iſland is alſo very pleaſant at a diſtance, whereas that of the others adjacent diſguſts the eye, by their too high, rocky, and bare hills. The name of *Parvich* ſeems to have been given it becauſe it is the firſt one meets with on going out of the harbour of Sibenico; for the Illyric word *parvi* ſignifies *firſt*.

PARULIDES, in *Surgery*, tumors and inflammations of the gums, commonly called *gum-boils*. They are to be treated with diſcutients like other inflammatory tumors.

PARUS, or TITMOUSE, a genus of birds belonging to the order of paſſeres. See ORNITHOLOGY *Index*.

PASCAL, BLAISE, one of the greateſt geniuſes and beſt writers France has produced, was born at Clermont in Auvergne, in the year 1623. His father, Stephen Paſcal, born in 1588, and of an ancient family, was preſident of the court of aids in his province: he was a very learned man, an able mathematician, and a friend of Deſcartes. Having an extraordinary tenderneſs for this child, his only ſon, he quitted his office in his province, and went and ſettled at Paris in 1631, that he might be quite at leiſure for the inſtruction of him; and Blaiſe never had any maſter but his father. From his infancy he gave proofs of a very extraordinary capacity: for he deſired to know the reaſon of every thing; and when good reaſons were not given him, he would ſeek for better; nor would he ever yield his aſſent but upon ſuch as appeared to him well grounded. There was room to fear, that with ſuch a caſt of mind he would fall into free thinking, or at leaſt into heterodoxy; yet he was always very far from any thing of this nature.

Paſcal

What is told of his manner of learning the mathematics, as well as the progreſs he quickly made in that ſcience, ſeems almoſt miraculous. His father, perceiving in him an extraordinary inclination to reaſoning, was afraid leſt the knowledge of the mathematics would hinder his learning the languages. He kept him therefore as much as he could from all notions of geometry, locked up all his books of that kind, and refrained even from ſpeaking of it in his preſence. He could not, however, make his ſon refrain from muſing upon proportions; and one day ſurpriſed him at work with charcoal upon his chamber-floor, and in the midſt of figures. He aſked him what he was doing? I am ſearching, ſays Paſcal, for ſuch a thing; which was juſt the 32d propoſition of the firſt book of Euclid. He aſked him then how he came to think of this? It was, ſays Paſcal, becauſe I have found out ſuch another thing: and ſo going backward, and uſing the names of *bar* and *round*, he came at length to the definitions and axioms he had formed to himſelf. Does it not ſeem miraculous that a boy ſhould work his way into the heart of a mathematical book, without ever having ſeen that or any other book upon the ſubject, or knowing any thing of the terms? Yet we are aſſured of the truth of this by Madame Perrier, and ſeveral other writers, the credit of whoſe teſtimony cannot reaſonably be queſtioned. He had, from henceforward, full liberty to indulge his genius in mathematical purſuits. He underſtood Euclid's Elements as ſoon as he caſt his eyes upon them: and this was not ſtrange; for, as we have ſeen, he underſtood them before. At 16 years of age he wrote a treatiſe of conic ſections, which was accounted by the moſt learned a mighty effort of genius; and therefore it is no wonder that Deſcartes, who had been in Holland a long time, ſhould, upon reading it, chooſe to believe that Mr Paſcal the father was the real author of it. At 19, he contrived an admirable arithmetical machine, which was eſteemed a very wonderful thing, and would have done credit as an invention to any man verſed in ſcience, and much more to ſuch a youth.—About this time his health became impaired, and he was in conſequence obliged to ſuſpend his labours; nor was he in a condition to reſume them till four years after. About that period, having ſeen Torricelli's experiment reſpecting a vacuum and the weight of the air, he turned his thoughts towards theſe objects; and in a conference with Mr Petit, intendant of fortifications, propoſed to make farther reſearches. In conſequence of this idea, he undertook ſeveral new experiments, one of which was as follows: Having provided a glaſs tube, 46 feet in length, open at one end, and ſealed hermetically at the other, he filled it with red wine, that he might diſtinguiſh the liquor from the tube. He then elevated it in this condition; and having placed it perpendicularly to the horizon, ſtopped up the bottom, and plunged it into a veſſel full of water, to the depth of a foot; after which he opened the extremity of the tube, and the wine deſcended to the diſtance of about 32 feet from the ſurface of the veſſel, leaving a conſiderable vacuum at the upper extremity. He next inclined the tube, and remarked that the wine roſe higher: and having inclined it till the top was within 32 feet of the ground, making the wine thus run out, he found that the water roſe in it, ſo that it was partly filled with that fluid, and partly with wine. He made alſo a great many experiments with ſiphons, ſyringes, bellows, and all kinds of tubes, making uſe of different liquors, ſuch as quickſilver, water, wine, oil, &c.; and having publiſhed them in 1647, diſperſed his work throughout all France, and tranſmitted it alſo to foreign countries. All theſe experiments, however, aſcertained effects, without demonſtrating the cauſes. Paſcal knew that Torricelli conjectured that thoſe phenomena which he had obſerved were occaſioned by the weight of the air (A); and, in order to diſcover the truth of this theory, he made an experiment at the top and bottom of a mountain in Auvergne, called *Le Puy de Dome*, the reſult of which gave him reaſon to conclude that air was weighty. Of this experiment he publiſhed an account, and ſent copies of it to moſt of the learned men in Europe. He likewiſe renewed it at the top of ſeveral high towers, ſuch as thoſe of Notre Dame at Paris, St Jacques de la Boucherie, &c.; and always remarked the ſame difference in the weight of the air, at different elevations. This fully convinced him of the weight of the atmoſphere; and from this diſcovery he drew many uſeful and important inferences. He compoſed alſo a large treatiſe, in which he thoroughly explained this ſubject, and replied to all the objections that had been ſtarted againſt it. As he thought this work rather too prolix, and as he was fond of brevity and preciſion, he divided it into two ſmall treatiſes, one of which he entitled, A Diſſertation on the Equilibrium of Liquors; and the other, An Eſſay on the Weight of the Atmoſphere. Theſe labours procured Paſcal ſo much reputation, that the greateſt mathematicians and philoſophers of the age propoſed various queſtions to him, and conſulted him reſpecting ſuch difficulties as they could not ſolve.—Some years after, while tormented with a violent fit of the toothache he diſcovered the ſolution of a problem propoſed by Father Merſenne, which had baffled the penetration of all thoſe who had attempted it. This problem was to determine the curve deſcribed in the air by the nail of a coach-wheel, while the machine is in motion. Paſcal offered a reward of 40 piſtoles to any one who ſhould give a ſatisfactory anſwer to it. No one, however, having ſucceeded, he publiſhed his own at Paris; but as he began now to be diſguſted with the ſciences, he would not put his real name to it, but ſent it abroad under that of A. d'Ettenville.—This was the laſt work which he publiſhed in the mathematics; his infirmities now increaſing ſo much, that he was under the neceſſity of renouncing ſevere ſtudy, and of living ſo recluſe, that he ſcarcely admitted any perſon to ſee him.

After he had thus laboured abundantly in mathematical and philoſophical diſquiſitions, he forſook thoſe ſtudies and all human learning at once; and determined to know nothing, as it were, for the future, but Jeſus Chriſt and him crucified. He was not 24 years of age, when the reading ſome pious books had put him upon taking this holy reſolution; and he became as great a devotee as any age has produced. Mr Paſcal now gave himſelf up entirely to a ſtate of prayer and mortification. He had always in his thoughts theſe great maxims, of renouncing all pleaſure and all ſuperfluity; and this he practiſed with rigour even in his illneſſes, to which he was frequently ſubject, being of a very invalid habit of body: for inſtance, when his ſickneſs obliged him to feed ſomewhat delicately, he took great care not to reliſh or taſte what he ate. He had no violent affection for thoſe he loved; he thought it ſinful, ſince a man poſſeſſes a heart which belongs only to God. He found fault with ſome diſcourſes of his ſiſter, which ſhe thought very innocent; as if ſhe had ſaid upon occaſion, that ſhe had ſeen a beautiful woman, he would be angry, and tell her, that ſhe might raiſe bad thoughts in footmen and young people. He frequently wore an iron girdle full of points next to his ſkin; and when any vain thought came into his head, or when he took particular pleaſure in any thing, he gave himſelf ſome blows with his elbow, to redouble the prickings, and to recal himſelf to his duty.

Though Mr Paſcal had thus abſtracted himſelf from the world, yet he could not forbear paying ſome attention to what was doing in it; and he even intereſted himſelf in the conteſt between the Jeſuits and the Janſeniſts. The Jeſuits, though they had the popes and kings on their ſide, were yet decried by the people, who brought up afreſh againſt them the aſſaſſination of Henry the Great, and all the old ſtories that were likely to make them odious. Paſcal went farther; and by his *Lettres Provinciales* (B), publiſhed in 1656, under the name of *Louis de Montalte*, made them the

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(A) Before this period, all thoſe effects which are now known to be produced by the weight of the atmoſphere, were attributed to Nature's abhorrence of a vacuum.

(B) The origin of theſe letters was this: for the ſake of unbending his mind, Paſcal uſed often to go to Port Royal des Champs, where one of his ſiſters had taken the veil, and where he had an opportunity of ſeeing the celebrated Mr Arnaud, and ſeveral of his friends. This gentleman's diſpute with the doctors of the Sorbonne, who were endeavouring to condemn his opinions, was of courſe frequently brought upon the carpet. Mr Arnaud, ſolicited to write a defence, had compoſed a treatiſe, which, however, did not meet with approbation, and which he himſelf conſidered as a very indifferent work. Paſcal being one day in company, ſome of thoſe preſent, who were ſenſible of his abilities, having ſaid to him, "You who are a young man ought to do ſomething;" he took the hint, and compoſed a letter, which he ſhowed to his friends, and which was ſo much admired, that they inſiſted on its being printed. The object of this letter is an explanation of the terms, *next power*, *ſufficient grace*, and *actual grace;* and the author here ſhows, as well as in two others which followed it, that a regard for the faith was not the motive which induced the doctors of the Sorbonne to enter into diſpute with Mr Arnaud, but a deſire of oppreſſing him by ridiculous queſtions. Paſcal, therefore, in other letters which he publiſhed afterwards, attacks the Jeſuits, whom he believed to be the authors of this quarrel, and in the moſt elegant ſtyle, ſeaſoned with wit and ſatire, endeavours to render them not only odious but ridiculous. For this

Paſcal.

the ſubject of ridicule. "Theſe letters (ſays Voltaire) may be conſidered as a model of eloquence and humour. The beſt comedies of Moliere have not more wit than the firſt part of theſe letters; and the ſublimity of the latter part of them is equal to any thing in Boſſuet. It is true, indeed, that the whole book was built upon a falſe foundation; for the extravagant notions of a few Spaniſh and Flemiſh Jeſuits were artfully aſcribed to the whole ſociety. Many abſurdities might likewiſe have been diſcovered among the Dominican and Franciſcan caſuiſts; but this would not have anſwered the purpoſe; for the whole raillery was to be levelled only at the Jeſuits. Theſe letters were intended to prove, that the Jeſuits had formed a deſign to corrupt mankind; a deſign which no ſect or ſociety ever had, or can have." Voltaire calls Paſcal the firſt of their ſatiriſts; for Deſpreaux, ſays he, muſt be conſidered as only the ſecond. In another place, ſpeaking of this work of Paſcal, he ſays, that "examples of all the various ſpecies of eloquence are to be found in it. Though it has been now written almoſt 100 years, yet not a ſingle word occurs in it, favouring of that viciſſitude to which living languages are ſo ſubject. Here then we are to fix the epocha when our language may be ſaid to have aſſumed a ſettled form. The biſhop of Lucon, ſon of the celebrated Buſſy, told me, that aſking one day the biſhop of Meaux what work he would covet moſt to be the author of, ſuppoſing his own performances ſet aſide, Boſſuet replied, The Provincial Letters." Theſe letters have been tranſlated into all languages, and printed over and over again. Some have ſaid, that there were decrees of formal condemnation againſt them; and alſo that Paſcal himſelf, in his laſt illneſs, deteſted them, and repented of having been a Janſeniſt: but both theſe particulars are falſe and without foundation. Father Daniel was ſuppoſed to be the anonymous author of a piece againſt them, entitled, The Dialogues of Cleander and Eudoxus.

Paſcal was only about the age of 30 when theſe letters were publiſhed, yet he was extremely infirm, and his diſorders increaſing ſoon after, ſo much that he conceived his end faſt approaching, he gave up all farther thoughts of literary compoſition. He reſolved to ſpend the remainder of his days in retirement and pious meditation; and with this view he broke off all his former connections, changed his habitation, and ſpoke to no one, not even to his own domeſtics. He made his own bed, fetched his dinner from the kitchen, carried it to his apartment, and brought back the plates and diſhes in the evening; ſo that he employed his ſervants only to cook for him, to go to town, and to do ſuch other things as he could not abſolutely do himſelf. In his chamber nothing was to be ſeen but two or three chairs, a table, a bed, and a few books. It had no kind of ornament whatever; he had neither a carpet on the floor nor curtains to his bed; but this did not prevent him from ſometimes receiving viſits; and when his friends appeared ſurpriſed to ſee him thus without furniture, he replied, that he had what was neceſſary, and that any thing elſe would be a ſuperfluity, unworthy of a wiſe man. He employed his time in prayer, and in reading the Holy Scriptures; and he wrote down ſuch thoughts as this exerciſe inſpired. Though his continual infirmities obliged him to uſe very delicate food, and though his ſervants employed the utmoſt care to provide only what was excellent, he never reliſhed what he ate, and ſeemed quite indifferent whether what they brought him was good or bad. When any thing new and in ſeaſon was preſented to him, and when he was aſked, after he had finiſhed his repaſt, how he liked it, he replied, "You ought to have informed me before-hand, I ſhould have then taken notice of it." His indifference in this reſpect was ſo great, that though his taſte was not vitiated, he forbade any ſauce or ragout to be made for him which might excite his appetite. He took without the leaſt repugnance all the medicines that were preſcribed him for the re-eſtabliſhment of his health; and when Madame Perrier, his ſiſter, ſeemed aſtoniſhed at it, he replied ironically, that he could not comprehend how people could ever ſhew a diſlike to a medicine, after being appriſed that it was a diſagreeable one, when they took it voluntarily; for violence or ſurpriſe ought only to produce that effect.

Though Paſcal had now given up intenſe ſtudy, and though he lived in the moſt temperate manner, his health continued to decline rapidly; and his diſorders had ſo enfeebled his organs, that his reaſon became in ſome meaſure affected. He always imagined that he ſaw a deep abyſs on his left ſide, and he never would ſit down till a chair was placed there, to ſecure him from the danger

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this purpoſe he employs the form of dialogue, and introduces an ignorant perſon, as men of the world generally are, who requeſts information reſpecting the queſtions in diſpute from theſe doctors, whom he conſults by propoſing his doubts; and his anſwers to their replies are ſo perſpicuous, pertinent, and juſt, that the ſubject is illuſtrated in the cleareſt manner poſſible. He afterwards expoſes the morality of the Jeſuits, in ſome converſations between him and one of their caſuiſts, in which he ſtill repreſents a man of the world, who ſeeks for inſtruction, and who, hearing maxims altogether new to him, ſeems aſtoniſhed, but ſtill liſtens with moderation. The caſuiſt believes that he is ſincere, and reliſhes theſe maxims; and under this perſuaſion he diſcovers every thing to him with the greateſt readineſs. The other is ſtill ſurpriſed; and as his inſtructor attributes this ſurpriſe only to the novelty of his maxims, he ſtill continues to explain himſelf with the ſame confidence and freedom. This inſtructor is a ſimple kind of man, who is not overburdened with acuteneſs, and who inſenſibly engages himſelf in details which always become more particular. The perſon who liſtens, wiſhing neither to contradict him nor to ſubſcribe to his doctrine, receives it with an ambiguous kind of raillery; which, however, ſufficiently ſhows what opinion he entertains of it. The Jeſuits reproached the author with having employed only raillery againſt them, and with having miſrepreſented ſeveral paſſages of their authors; which induced Paſcal to write eight more in vindication of himſelf. All theſe letters, in number 18, written in a ſtyle altogether new in France, appeared in 4to, one after another, from the month of January 1656, to the month of March of the year following.

danger which he apprehended. His friends did every thing in their power to baniſh this melancholy idea from his thoughts, and to cure him of his error, but without the deſired effect; for though he would become calm and compoſed for a little, the phantom would in a few moments again make its appearance and torment him. The cauſe of his ſeeing this ſingular viſion for the firſt time, is ſaid to have been as follows: His phyſicians, alarmed on account of the exhauſted ſtate to which he was reduced, had adviſed him to ſubſtitute eaſy and agreeable exerciſe for the fatiguing labours of the cloſet. One day, in the month of October 1654, having gone according to cuſtom to take an airing on the Pont de Neuilly, in a coach and four, the two firſt horſes ſuddenly took fright, oppoſite to a place where there was no parapet, and threw themſelves violently into the Seine; but the traces luckily giving way, the carriage remained on the brink of the precipice. The ſhock which Paſcal, in his languiſhing ſituation, muſt have received from this dreadful accident, may eaſily be imagined. It threw him into a fit, which continued for ſome time, and it was with great difficulty that he could be reſtored to his ſenſes. After this period his brain became ſo deranged, that he was continually haunted by the remembrance of his danger, eſpecially when his diſorders prevented him from enjoying ſleep. To the ſame cauſe was attributed a kind of viſion or ecſtaſy that he had ſome time after; a memorandum of which he preſerved during the remainder of his life in a bit of paper, put between the cloth and the lining of his coat, and which he always carried about him. Some of the Jeſuits had the baſeneſs and inhumanity to reproach this great genius with the derangement of his organs. In the Dictionary of Janſeniſt Books, he is called a *hypochondriac*, and a man of a *wrong head*, and a *bad heart*. But, as a celebrated writer has obſerved, Paſcal's diſorder had in it nothing more ſurpriſing or diſgraceful than a fever, or the vertigo. During the laſt years of his life, in which he exhibited a melancholy example of the humiliating reverſes which take place in this tranſitory ſcene, and which, if properly conſidered, might teach mankind not to be too proud of thoſe abilities which a moment may take from them, he attended all the ſalutations (c), viſited every church in which relicks were expoſed, and had always a ſpiritual almanack, which gave an account of all thoſe places where particular acts of devotion were performed. On this occaſion it has been ſaid, that "Religion renders great minds capable of little things, and little minds capable of great."

In company, Paſcal was diſtinguiſhed by the amiableneſs of his behaviour; by his eaſy, agreeable, and inſtructive converſation, and by great modeſty. He poſſeſſed a natural kind of eloquence, which was in a manner irreſiſtible. The arguments he employed for the moſt part produced the effect which he propoſed; and though his abilities intitled him to aſſume an air of ſuperiority, he never diſplayed that haughty and imperious tone which may often be obſerved in men of ſhining talents. The philoſophy of this great man conſiſted in renouncing all pleaſure, and every ſuperfluity. He not only denied himſelf the moſt common gratifications; but he took alſo without reluctance, and even with pleaſure, either as nouriſhment or as remedies, whatever was diſagreeable to the ſenſes; and he every day retrenched ſome part of his dreſs, food, or other things, which he conſidered as not abſolutely neceſſary. Towards the cloſe of his life, he employed himſelf wholly in pious and moral reflections, writing down thoſe which he judged worthy of being preſerved. The firſt piece of paper he could find was employed for this purpoſe; and he commonly put down only a few words of each ſentence, as he wrote them merely for his own uſe. The bits of paper upon which he had written theſe thoughts, were found after his death filed upon different pieces of ſtring, without any order or connection; and being copied exactly as they were written, they were afterwards arranged and publiſhed.

The celebrated Bayle, ſpeaking of this great man, ſays, An hundred volumes of ſermons are not of ſo much avail as a ſimple account of the life of Paſcal. His humility and his devotion mortified the libertines more than if they had been attacked by a dozen of miſſionaries. In a word, Bayle had ſo high an idea of this philoſopher, that he calls him *a paradox in the human ſpecies*. "When we conſider his character (ſays he), we are almoſt inclined to doubt that he was born of a woman, like the man mentioned by Lucretius:

"*Ut vix humana videatur ſtirpe creatus.*"

Mr Paſcal died at Paris the 19th of Auguſt 1662, aged 39 years. He had been ſome time about a work againſt atheiſts and infidels, but did not live long enough to digeſt the materials he had collected. What was found among his papers was publiſhed under the title of *Penſées*, &c. or *Thoughts upon religion and other ſubjects*, and has been much admired. After his death appeared alſo two other little tracts; one of which is intitled, *The equilibrium of fluids*; and the other, *The weight of the maſs of air*.

The works of Paſcal were collected in five volumes 8vo, and publiſhed at the Hague by De Tune, and at Paris by Nyon ſenior, in 1779. This edition of Paſcal's works may be conſidered as the firſt publiſhed; at leaſt the greater part of them were not before collected into one body; and ſome of them had remained only in manuſcript. For this collection, the public were indebted to the abbé Boſſu, and Paſcal deſerved to have ſuch an editor. "This extraordinary man (ſays he) inherited from nature all the powers of genius. He was a geometrician of the firſt rank, a profound reaſoner, and a ſublime and elegant writer. If we reflect, that in a very ſhort life, oppreſſed by continual infirmities, he invented a curious arithmetical machine, the elements of the calculation of chances, and a method of reſolving various problems reſpecting the cycloid; that he fixed in an irrevocable manner the wavering opinions of the learned reſpecting the weight of the air; that he wrote one of the completeſt works which exiſt in the French language; and that in his Thoughts there are paſſages, the

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(c) Certain ſolemn prayers, which are repeated at certain hours, and on certain days, in the Popiſh churches.

the depth and beauty of which are known to all;—we ſhall be induced to believe, that a greater genius never exiſted in any age or nation. All thoſe who were admitted to frequent his company in the ordinary commerce of the world, acknowledged his ſuperiority; but it excited no envy againſt him, as he was never fond of ſhowing it. His converſation inſtructed, without making thoſe who heard him ſenſible of their own inferiority; and he was remarkably indulgent towards the faults of others. It may be eaſily ſeen by his Provincial Letters, and by ſome of his other works, that he was born with a great fund of humour, which his infirmities could never entirely deſtroy. In company, he readily indulged in that harmleſs and delicate raillery which never gives offence, and which greatly tends to enliven converſation; but its principal object generally was of a moral nature. For example, ridiculing thoſe authors who ſay, *My Book*, *my Commentary*, *my Hiſtory*, they would do better (ſaid he) to ſay, *Our Book*, *our Commentary*, *our Hiſtory*; ſince there are in them much more of other people's than their own." An elegant Latin epitaph was inſcribed on his tomb.

PASCHAL, ſomething belonging to the paſſover, or Eaſter. See PASSOVER and EASTER.

PAS-EP-A, the chief of the Lamas, particularly eminent for having invented characters for the Moguls. He was much eſteemed by the Chineſe, though the literati exclaimed againſt the manner in which the people demonſtrated their affection. There is ſtill at Pekin a *myau* or temple, built in honour of Paſ-ep-a in the time of the Mogul emperors. He died in 1279.

PASIGRAPHY (from πας *omnis*, and γραφω, *ſcribo*), the art of writing on any ſubject whatever, ſo as to be univerſally underſtood by all nations upon earth. The idea of eſtabliſhing ſuch a language is deemed by many extremely fanciful and abſurd, while the practicability of it is as ſtrenuouſly contended for by others. Hints reſpecting ſuch a ſyſtem of writing as might be underſtood by all mankind, are to be met with in the writings of many eminent philoſophers; but if ſuch an attempt failed in the hands of a Leibnitz, a Kircher, a Becher, a Wilkins, and ſome others, it is at leaſt to be preſumed, that the execution of a paſigraphy, or univerſal language, will always be found to bear a ſtriking analogy to the chimerical ſentiments which were formerly entertained reſpecting the doctrines of the quadrature of the circle, the multiplication of the cube, the philoſopher's ſtone, or perpetual motion, all of which have been finely ridiculed by Dean Swift in his idea of circular ſhot. Kant is clearly of opinion, however, that ſuch a paſigraphy falls within the limits of poſſibility:—nay, he even aſſerts, that it will actually be eſtabliſhed at ſome future period. And, while none of its admirers venture to bid us believe that it will ever be univerſally ſpoken or underſtood, they confidently think, that, by means of it, the valuable labours of erudition and human genius will be effectually prevented from ever falling into oblivion. See a Memoir on this ſubject in Nicholſon's Journal, ii. 347. 402.

PASIPHAE, in fabulous hiſtory, daughter of the Sun by Perſeis, who married Minos king of Crete. She diſgraced herſelf by an unnatural paſſion for a bull, which we are told ſhe was enabled to gratify by means of the artiſt Dædalus. This celebrated bull had been given to Minos by Neptune, to be offered on his altars. But as the monarch refuſed to ſacrifice the animal on account of his beauty, the god revenged his diſobedience by inſpiring Paſiphaë with an unnatural love for him. This fable, which is univerſally believed by the poets, who obſerve, that the minotaur was the fruit of this infamous commerce, is refuted by ſome writers; who ſuppoſe that the infidelity of Paſiphaë to her huſband was betrayed in her affection for an officer of the name of Taurus, and that Dædalus, by permitting his houſe to be the aſylum of the two lovers, was looked upon as acceſſory to the gratification of Paſiphaë's luſt. From this amour with Taurus, as it is farther remarked, the queen became mother of twins; and the name of *Minotaurus* ariſes from the reſemblance of the children to the huſband and the lover of Paſiphaë. Minos had four ſons by Paſiphaë, Caſtreus, Deucalion, Glaucus, and Androgeus; and three daughters, Hecate, Ariadne, and Phædra.

PASQUIN, a mutilated ſtatue at Rome, in a corner of the palace of the Urſini. It takes its name from a cobler of that city called *Paſquin*, famous for his ſneers and gibes, and who diverted himſelf by paſſing his jokes on all that went through that ſtreet. After his death, as they were digging up the pavement before his door, they found in the earth the ſtatue of an ancient gladiator, well cut, but maimed and half-ſpoiled: this they ſet up in the place where it was found, and by common conſent named it *Paſquin*. Since that time all ſatires are attributed to that figure; and are either put into its mouth, or paſted upon it, as if they were written by Paſquin redivivus; and theſe are addreſſed by Paſquin to Marforio, another ſtatue at Rome. When Marforio is attacked, Paſquin comes to his aſſiſtance; and, when Paſquin is attacked, Marforio aſſiſts him in his turn; that is, the people make the ſtatues ſpeak juſt what they pleaſe.

PASQUINADE, a ſatirical libel faſtened to the ſtatue of Paſquin: theſe are commonly ſhort, witty, and pointed; and from hence the term has been applied to all lampoons of the ſame caſt.

PASS, or PASSADE, in fencing, an advance or leap forward upon the enemy. Of theſe there are ſeveral kinds; as paſſes within, above, beneath, to the right, the left, and paſſes under the line, &c. The meaſure of the paſs is when the ſwords are ſo near as that they may touch one another.

PASS, in a military ſenſe, a ſtrait and difficult paſſage, which ſhuts up the entrance into a country.

PASS Parole, in military affairs, a command given at the head of an army, and thence communicated to the rear, by paſſing it from mouth to mouth.

PASSADE, in the manege, is a turn or courſe of a horſe backwards or forwards on the ſame ſpot of ground. Hence there are ſeveral ſorts of paſſades, according to the different ways of turning, in order to part or return upon the ſame tread, which is called *cloſing the paſſade*; as the paſſade of one time, the paſſade of five times, and the raiſed or high paſſades, into which the demivolts are made into curvets. See HORSEMANSHIP.

North-weſt PASSAGE. } See *NORTH-Weſt Paſſage*,
North-eaſt PASSAGE. } *NORTH-Eaſt Paſſage*, and POLE.

Right of PASSAGE, in commerce, is an impoſition or duty exacted by ſome princes, either by land or ſea, in certain cloſe and narrow places in their territories, on all veſſels and carriages, and even ſometimes on perſons or paſſengers, coming in or going out of ports, &c. The moſt celebrated paſſage of this kind in Europe is the Sound: the dues for paſſing which ſtrait belong to the king of Denmark, and are paid at Elſinore or Cronenburg.

PASSANT, in *Heraldry*, a term applied to a lion or other animal in a ſhield, appearing to walk leiſurely: for moſt beaſts, except lions, the *trippant* is frequently uſed inſtead of *paſſant*.

PASSAU, an ancient, handſome, and celebrated town of Germany, in Lower Bavaria, with a biſhop's ſee and fort. The houſes are well built, and the cathedral is thought to be the fineſt in all Germany. It is divided into four parts, three of which are fortified; but the other is only a ſuburb, and has nothing but an old caſtle in which the biſhop generally reſides. It is ſeated at the confluence of the rivers Inn and Iltz, in E. Long. 13. 34. N. Lat. 48. 26.

Passau, a biſhopric of Germany, lying between Lower Bavaria, Auſtria, and Bohemia. It extends not above 20 miles where largeſt; and has no conſiderable place, except the capital, which is of the ſame name.

PASSERES, the name of one of the orders (the 6th) into which the claſs of birds is divided. See Ornithology *Index*.

PASSIFLORA, or Passion flower; a genus of plants belonging to the gynandria claſs; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. See Botany *Index*.

PASSION, is a word of which, as Dr Reid obſerves, the meaning is not preciſely aſcertained either in common diſcourſe or in the writings of philoſophers. In its original import, it denotes every *feeling* of the mind occaſioned by an extrinſic cauſe; but it is generally uſed to ſignify ſome *agitation* of mind, oppoſed to that ſtate of tranquillity in which a man is moſt maſter of himſelf. That it was thus uſed by the Greeks and Romans, is evident from Cicero's rendering παθος, the word by which the philoſophers of Greece expreſſed it, by *perturbatio* in Latin. In this ſenſe of the word, paſſion cannot be itſelf a *diſtinct* and *independent* principle of action; but only an occaſional degree of vehemence given to thoſe diſpoſitions, deſires, and affections, which are at all times preſent to the mind of man; and that this is its proper ſenſe, we need no other proof than that paſſion has always been conceived to bear analogy to a ſtorm at ſea or to a tempeſt in the air.

With reſpect to the number of paſſions of which the mind is ſuſceptible, different opinions have been held by different authors. Le Brun, a French writer on painting, juſtly conſidering the expreſſion of the paſſions as a very important as well as difficult branch of his art, has enumerated no fewer than twenty, of which the ſigns may be expreſſed by the pencil on canvaſs. That there are ſo many different ſtates of mind producing different effects which are viſible on the features and the geſtures, and that thoſe features and geſtures ought to be diligently ſtudied by the artiſt, are truths which cannot be denied; but it is abſurd to conſider all theſe different ſtates of mind as *paſſions*, ſince tranquillity is one of them, which is the reverſe of paſſion.

The common diviſion of the paſſions into *deſire* and *averſion*, *hope* and *fear*, *joy* and *grief*, *love* and *hatred*, has been mentioned by every author who has treated of them, and needs no explication; but it is a queſtion of ſome importance in the philoſophy of the human mind, whether theſe different paſſions be each a degree of an original and innate diſpoſition, diſtinct from the diſpoſitions which are reſpectively the foundations of the other paſſions, or only different modifications of one or two general diſpoſitions common to the whole race.

The former opinion is held by all who build their ſyſtem of metaphyſics upon a number of diſtinct internal ſenſes; and the latter is the opinion of thoſe who, with Locke and Hartley, reſolve what is commonly called inſtinct into an early aſſociation of ideas. (See Instinct). That without deliberation mankind inſtantly feel the paſſion of fear upon the apprehenſion of danger, and the paſſion of anger or reſentment upon the reception of an injury, are truths which cannot be denied: and hence it is inferred, that the ſeeds of theſe paſſions are innate in the mind, and that they are not generated, but only ſwell to magnitude on the proſpect of their reſpective objects. In ſupport of this argument, it has been obſerved that children, without any knowledge of their danger, are inſtinctively afraid on being placed on the brink of a precipice; and that this paſſion contributes to their ſafety long before they acquire, in any degree equal to their neceſſities, the exerciſe of their rational powers. Deliberate anger, cauſed by a voluntary injury, is acknowledged to be in part founded on reaſon and reflection; but where anger impels one ſuddenly to return a blow, even without thinking of doing miſchief, the paſſion is inſtinctive. In proof of this, it is obſerved, that inſtinctive anger is frequently raiſed by bodily pain, occaſioned even by a ſtock or a ſtone, which inſtantly becomes an object of reſentment, that we are violently incited to cruſh to atoms. Such conduct is certainly not rational, and therefore it is ſuppoſed to be neceſſarily inſtinctive.

With reſpect to other paſſions, ſuch as the luſt of power, of fame, or of knowledge, innumerable inſtances, ſays Dr Reid, occur in life, of men who ſacrifice to them their eaſe, their pleaſure, and their health. But it is abſurd to ſuppoſe that men ſhould ſacrifice the end to what they deſire only as means of promoting that end; and therefore he ſeems to think that theſe paſſions muſt be innate. To add ſtrength to this reaſoning, he obſerves, that we may perceive ſome degree of theſe principles even in brute animals of the moſt ſagacious kind, who are not thought to deſire means for the ſake of ends which they have in view.

But it is in accounting for the paſſions which are diſintereſted that the advocates for innate principles ſeem moſt completely to triumph. As it is impoſſible not to feel the paſſion of pity upon the proſpect of a fellow creature in diſtreſs, they argue, that the baſis of that paſſion muſt be innate; becauſe pity, being at all times more or leſs painful to the perſon by whom it is felt, and frequently of no uſe to the perſon who is its object, it cannot in ſuch inſtances be the reſult of deliberation, but merely the exertion of an original inſtinct. The ſame kind of reaſoning is employed to prove that gratitude is the exerciſe of an innate principle. That good offices are, by the very conſtitution of our nature, apt to produce good will towards the benefactor, in good and bad men, in the ſavage and in the civilized, cannot ſurely be denied by any one in the leaſt acquainted with human nature. We are grateful not only to the benefactors of ourſelves as individuals, but alſo to the benefactors of our country; and *that*, too, when we are conſcious that from our gratitude neither they nor we can reap any advantage. Nay, we are impelled to be grateful even when we have reaſon to believe that the objects of our gratitude know not our exiſtence. This paſſion cannot be the effect of reaſoning, or of aſſociation founded on reaſoning; for, in ſuch caſes as thoſe mentioned, there are no principles from which reaſon can infer the propriety or uſefulneſs of the feeling. That *public ſpirit*, or the affection which we bear to our country, or to any ſubordinate community of which we are members, is founded on inſtinct, is deemed ſo certain, that the man deſtitute of this affection, if there be any ſuch, has been pronounced as great a monſter as he who has two heads.

All the diſintereſted paſſions are founded on what philoſophers have termed *benevolent affection*. Inſtead therefore of inquiring into the origin of each paſſion ſeparately, which would ſwell this article to no purpoſe, let us liſten to one of the fineſt writers as well as ableſt reaſoners of the age, treating of the origin of benevolent affection. "We may lay it down as a principle (ſays Dr Reid †), that all benevolent affections are in their nature agreeable; that it is eſſential to them to deſire the good and happineſs of their objects; and that their objects muſt therefore be beings capable of happineſs. A thing may be deſired either on its own account, or as the means in order to ſomething elſe. That only can properly be called an object of deſire which is deſired upon its own account; and therefore I conſider as benevolent thoſe affections only which deſire the good of their object ultimately, and not as means in order to ſomething elſe. To ſay that we deſire the good of others, only to procure ſome pleaſure or good to ourſelves, is to ſay that there is no benevolent affection in human nature. This indeed has been the opinion of ſome philoſophers both in ancient and in later times. But it appears as unreaſonable to reſolve all benevolent affections into ſelf-love, as it would be to reſolve hunger and thirſt into ſelf-love. Theſe appetites are neceſſary for the preſervation of the individual. Benevolent affections are no leſs neceſſary for the preſervation of ſociety among men; without which men would become an eaſy prey to the beaſts of the field. The benevolent affections planted in human nature, appear therefore no leſs neceſſary for the preſervation of the human ſpecies than the appetites of hunger and thirſt." In a word, pity, gratitude, friendſhip, love, and patriotiſm, are founded on different benevolent affections; which our learned author holds to be original parts of the human conſtitution."

† *Eſſays on the Active Powers of Man.*

This reaſoning has certainly great force; and if authority could have any weight in ſettling a queſtion of this nature, we know not that name to which greater deference is due than the name of him from whom it is taken. Yet it muſt be confeſſed that the philoſophers, who conſider the affections and paſſions as early and deep rooted aſſociations, ſupport their opinion with very plauſible arguments. On their principles we have endeavoured elſewhere to account for the paſſions of fear and love, (ſee Instinct and Love); and we may here ſafely deny the truth of what has been ſtated reſpecting fear, which ſeems to militate againſt that account. We have attended with much ſolicitude to the actions of children; and have no reaſon to think that they feel terror on the brink of a precipice till they have been repeatedly warned of their danger in ſuch ſituations by their parents or their keepers. Every perſon knows not only that they have no original or inſtinctive dread of fire, which is as dangerous to them as any precipice; but that it is extremely difficult to keep them from that deſtructive element till they are either capable of weighing the force of arguments, or have repeatedly experienced the pain of being burnt by it. With reſpect to ſudden reſentment, we cannot help conſidering the argument, which is brought in proof of its being inſtinctive, as proving the contrary in a very forcible manner. Inſtinct is ſome myſterious influence of God upon the mind exciting to actions of beneficial tendency: but can any benefit ariſe from wreaking our impotent vengeance on a ſtock or a ſtone? or is it ſuppoſable that a Being of infinite wiſdom would excite us to actions ſo extravagantly fooliſh? We learn from experience to defend ourſelves againſt rational or ſenſible enemies by retaliating the injuries which they inflict upon us; and if we have been often injured in any particular manner, the idea of that injury becomes in time ſo cloſely aſſociated with the means by which it has been conſtantly repelled, that we never receive ſuch an injury—a blow for inſtance—without being prompted to make the uſual retaliation, without reflecting whether the object be ſenſible or inſenſible. So far from being inſtinctive does reſentment appear to us, that we think an attentive obſerver may eaſily perceive how the ſeeds of it are gradually infuſed into the youthful mind; when the child, from being at firſt a timid creature ſhrinking from every pain, learns by degrees to return blow for blow and threat for threat.

But inſtead of urging what appears to ourſelves of moſt weight againſt the inſtinctive ſyſtem, we ſhall lay before our readers a few extracts from a diſſertation on the origin of the paſſions, by a writer whoſe elegance of language and ingenuity of inveſtigation do honour to the ſchool of Hartley.

"When an infant is born (ſays Dr Sayers †), there is every reaſon to ſuppoſe that he is born without ideas. Theſe are rapidly communicated through the medium of the ſenſes. The ſame ſenſes are alſo the means of conveying to him pleaſure and pain. Theſe are the hinges on which the paſſions turn: and till the child is acquainted with theſe ſenſations, it would appear that no paſſion could be formed in his mind; for till he has felt pleaſure and pain, how can he deſire any object, or wiſh for its removal? How can he either love or hate? Let us obſerve then the manner in which love and hatred are formed; for on theſe paſſions depend all the reſt. When a child endures pain, and is able to detect the cauſe of it, the idea of pain is connected in his mind with that of the thing which produced it; and if the object which occaſioned pain be again preſented to the child, the idea of pain aſſociated with it ariſes alſo. This idea conſequently urges the child to avoid or to remove the object; and thus ariſes the paſſion of diſlike or hatred. In the ſame manner, the paſſion of liking or love is readily formed in the mind of a child from the aſſociation of pleaſant ideas with certain objects which produced them.

† *Diſſertations Moral and Literary.*

"The paſſions of hope and fear are ſtates of the mind depending upon the good or bad proſpects of gratifying love or hatred; and joy or ſorrow ariſes from the final ſucceſs or diſappointment which attends the exertions produced by love or by hatred. Out of theſe paſſions, which have all a perceptible relation to our own good, and are univerſally acknowledged to be ſelfiſh, all our other paſſions are formed."

To account for the paſſions called *diſintereſted*, he obſerves, that in the hiſtory of the human mind we find many inſtances of our dropping an intermediate idea, which has been the means of our connecting two other ideas together; and that the aſſociation of theſe two remains after the link which originally united them has vaniſhed. Of this fact the reader will find ſufficient evidence in different articles of this work (See INSTINCT, N° 19, and METAPHYSICS, N° 101): and, to apply it to the diſintereſted paſſions, let us ſuppoſe, with Dr Sayers, that any individual has done to us many offices of kindneſs, and has conſequently much contributed to our happineſs; it is natural for us to ſeek with ſome anxiety for the continuance of thoſe pleaſures which he is able to communicate. But we ſoon diſcern, that the ſureſt way of obtaining the continuance of his friendly offices is to make them, as much as poſſible, a ſource of pleaſure to himſelf. We therefore do every thing in our power to promote his happineſs in return for the good he has conferred upon us, that thus we may attach him to us as much as we are able. Hitherto all is plainly ſelfiſh. We have been evidently endeavouring, for the ſake of our own future gratification, to promote the happineſs of this perſon: but obſerve the conſequence. We have thus, by contemplating the advantage, to be derived to ourſelves from promoting the proſperity of our friend, learned to aſſociate a ſet of pleaſant ideas with his happineſs; but the link which has united them gradually eſcapes us, while the union itſelf remains. Continuing to aſſociate pleaſure with the well-being of our friend, we endeavour to promote it for the ſake of his *immediate* gratification, without looking farther; and in this way his happineſs, which was firſt attended to only as a means of future enjoyment, finally becomes an end. Thus then the paſſion which was originally ſelfiſh, is at length *diſintereſted*; its gratification being completed merely by its ſucceſs in promoting the happineſs of another.

In this way does our author account for the origin of gratitude; which at laſt becomes a habit, and flows ſpontaneouſly towards every man who has either been or intended to be our benefactor. According to him, it is eaſy to obſerve alſo, that from aſſociating pleaſure with the happineſs of an individual when we procure it ourſelves, it muſt of courſe ſoon follow, that we ſhould experience pleaſure from a view of his happineſs any way produced; ſuch happineſs raiſing at all times pleaſant ideas when it is preſented to our minds. This is another feature of a diſintereſted affection, to feel delight from the mere increaſe of happineſs in the object whom we love.

"It may be objected, perhaps, that parents ſeem to have an *inſtinctive* diſintereſted love of their offspring: but ſurely the love of a parent (A) for a new-born infant is not uſually equal to that for a child of four or five years old. When a child is firſt born, the proſpect and hopes of future pleaſure from it are ſufficient to make a parent anxious for its preſervation. As the child grows up, the hope of future enjoyment from it muſt increaſe: hence would pleaſure be aſſociated with the well-being of the child, the love of which would of courſe become in due time diſintereſted."

Our author does not analyze *pity*, and trace it to its ſource in ſelfiſhneſs; but he might eaſily have done it, and it has been ably done by his maſter. Pity or compaſſion is the uneaſineſs which a man feels at the miſery of another. It is generated in every mind during the years of childhood; and there are many circumſtances in the conſtitution of children, and in the mode of their education, which make them particularly ſuſceptible of his paſſion. The very appearance of any kind of miſery which they have experienced, or of any ſigns of diſtreſs which they underſtand, excite in their minds painful feelings, from the remembrance of what they have ſuffered, and the apprehenſion of their ſuffering it again. We have ſeen a child a year old highly entertained with the noiſe and ſtruggles made by its elder brother when plunged naked into a veſſel filled with cold water. This continued to be the caſe for many days, till it was thought proper to plunge the younger as well as the elder; after which the daily entertainment was ſoon at an end. The little creature had not been itſelf plunged above twice till it ceaſed to find diverſion in its brother's ſufferings.—On the third day it cried with all the ſymptoms of the bittereſt anguiſh upon ſeeing its brother plunge, though no preparation was then made for plunging itſelf; but ſurely this was not diſintereſted ſympathy, but a feeling wholly ſelfiſh, excited by the remembrance of what it had ſuffered itſelf, and was apprehenſive of ſuffering again. In a ſhort time, however, the painful feelings accompanying the ſight of its brother's ſtruggles, and the ſound of his cries, were doubtleſs ſo aſſociated with that ſight and that ſound, that the appearance of the latter would have brought the

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(A) That this is true of the father is certain; but it may be queſtioned whether it be equally true of the mother. A woman is no ſooner delivered of her infant, than ſhe careſſes it with the utmoſt poſſible fondneſs. We believe, that if ſhe were under the neceſſity of making a choice between her child of four years, and her infant an hour old, ſhe would rather be deprived of the latter than of the former; but we are not convinced that this would proceed from a leſs degree of affection to the infant than to the child. She knows that the child has before his fourth year eſcaped many dangers which the infant muſt encounter, and may not eſcape; and it is therefore probable that her choice would be the reſult of prudent reflection. Though we are not admirers of that philoſophy which ſuppoſes the human mind a bundle of inſtincts, we can as little approve of the oppoſite ſcheme which allows it no inſtincts at all. The στοργη of a mother to her new-born infant is undoubtedly inſtinctive, as the only thing which at that moment can be aſſociated with it in her mind is the pain ſhe has ſuffered in bringing it to the world.

favour along with them, even though the child might have been no longer under apprehenſion of a plunging itſelf. This aſſociation, too, would ſoon be transferred to every boy in the ſame circumſtances, and to ſimilar ſounds and ſtruggles, from whatever cauſe they might proceed.

Thus, as Dr Hartley obſerves †, "when ſeveral children are educated together, the pains, the denials of pleaſure, and the ſorrows which affect one generally extend to all in ſome degree, often in an equal one. When their parents, companions, or attendants are ſick, or afflicted, it is uſual to raiſe in their minds the naſcent ideas of pains and miſeries by ſuch words and ſigns as are ſuited to their capacities. They alſo find themſelves laid under many reſtraints, on account of the ſickneſs or affliction of others; and when theſe and ſuch like circumſtances have raiſed in their minds deſires to remove the cauſes of their own internal feelings, i. e. to eaſe the miſeries of others, a variety of internal feelings and deſires become ſo blended and aſſociated together, as that no part can be diſtinguiſhed ſeparately from the reſt, and the child may properly be ſaid to have compaſſion. The ſame ſources of compaſſion remain, though with ſome alteration, during our whole progreſs through life. This is ſo evident, that a reflecting perſon may plainly diſcern the conſtituent parts of his compaſſion while they are yet the mere internal, and, as one may ſay, ſelfiſh feelings above mentioned; and before they have put on the nature of compaſſion by a coaleſcence with the reſt. Agreeably to this method of reaſoning, it may be obſerved, that perſons whoſe nerves are eaſily irritable, and thoſe who have experienced great trials and afflictions, are in general more diſpoſed to compaſſion than others; and that we are moſt apt to pity others in thoſe diſeaſes and calamities which we either have felt or of which we apprehend ourſelves to be in danger."

The origin of patriotiſm and public ſpirit is thus traced by Dr Sayers: "The pleaſures which our country affords are numerous and great. The wiſh to perpetuate the enjoyment of theſe pleaſures, includes the wiſh to promote the ſafety and welfare of our country, without which many of them would be loſt. All this is evidently ſelfiſh; but, as in the progreſs of gratitude, it finally becomes diſintereſted. Pleaſant ideas are thus ſtrongly connected with the welfare of our country, after the tie which firſt bound them together has eſcaped our notice. The proſperity which was at firſt deſirable as the means of future enjoyment, becomes itſelf an end: we feel delight in ſuch proſperity, however produced; and we look not beyond this immediate delight. It is thus not difficult to obſerve in what manner a general and diſintereſted benevolence takes place in a mind which has already received pleaſure from the happineſs of a few; the tranſition is eaſy towards aſſociating it with *happineſs in general*, with the happineſs of any being, whether produced by ourſelves or by any other cauſe whatever."

From this reaſoning, our author concludes, that all our paſſions may be traced up to original feelings of regard for ourſelves. "Thus (in the forcible language of a learned writer * of the ſame ſchool) does ſelf love, under the varying appearance of natural affection, domeſtic relation, and the connexions of ſocial habitude, at firſt work blindly on, obſcure and deep in dirt. But as it makes its way, it continues riſing, till it emerges into light; and then ſuddenly expiring, leaves behind it the faireſt iſſue,"—benevolent affection.

Self-love partook the path it firſt purſu'd,
And found the private in the public good.

Thus have we ſtated the two oppoſite theories reſpecting the origin of paſſions in the mind, and given our readers a ſhort ſpecimen of the reaſonings by which they are ſupported by their reſpective patrons. Were we called upon to decide between them, we ſhould be tempted to ſay, that they have both been carried to extremes by ſome of their advocates, and that the truth lies in the middle between them. "It is impoſſible † but that creatures capable of pleaſant and painful ſenſations, ſhould love and chooſe the one, and diſlike and avoid the other. No being who knows what happineſs and miſery are, can be ſuppoſed indifferent to them, without a plain contradiction. Pain is not a *poſſible* object of deſire, nor happineſs of *averſion*."—To prefer a greater good though diſtant, to a leſs good that is preſent; or to chooſe a preſent evil, in order to avoid a greater future evil—is indeed wiſe and rational conduct; but to chooſe evil ultimately, is abſolutely impoſſible. Thus far then muſt be admitted, that every being poſſeſſed of ſenſe and intellect, neceſſarily deſires his own good as ſoon as he knows what it is; but if this knowledge be not innate, neither can the deſire. Every human being comes into the world with a capability of knowledge, and of courſe with a capability of affections, deſires, and paſſions; but it ſeems not to be conceivable how he can actually love, or hate, or dread any thing, till he know whether it be good, or ill, or dangerous. If, therefore, we have no innate ideas, we cannot poſſibly have innate deſires or averſions. Thoſe who contend that we have, ſeem to think, that without them reaſon would be inſufficient, either for the preſervation of the individual or the continuation of the ſpecies; and ſome writers have alleged, that if our affections and paſſions were the mere reſult of early aſſociations, they would neceſſarily be more capricious than we ever find them. But this objection ſeems to ariſe from their not rightly underſtanding the theory of their antagoniſts. The diſciples of Locke and Hartley do not ſuppoſe it poſſible for any man in ſociety to prevent ſuch aſſociations from being formed in his mind as ſhall neceſſarily produce deſires and averſions; far leſs do they think it poſſible to form aſſociations of ideas utterly repugnant, ſo as to deſire that as good which his ſenſes and intellect have experienced to be evil. Aſſociations are formed by the very ſame means, and at the very ſame time, that ideas and notions are impreſſed upon the mind; but as pain is never miſtaken for pleaſure by the ſenſes, ſo an object which has given us only pain, is never aſſociated with any thing that makes it deſireable. We ſay an object that has given us only pain, becauſe it is poſſible to form ſuch an aſſociation between life and the loſs of a limb, as to make us grateful to the ſurgeon by whom it was amputated. Aſſociations being formed according to the ſame laws by which knowledge is acquired, it by no means follows that paſſions reſulting from them ſhould be more capricious than they are found to be; and they certainly are ſufficiently capricious to make us ſuſpect that the greater part of them has this origin, rather than that they are all infuſed in the mind by the immediate agency of the Creator.

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† Obſervations on Man.

* Warburton.

† Dr Pric Review, &c.

Paſſion.

Creator. If man be a being formed with no innate ideas, and with no other inſtinctive principles of action than what are abſolutely neceſſary to preſerve his exiſtence and perpetuate the ſpecies, it is eaſy to perceive why he is placed in this world as in a ſtate of probation, where he may acquire habits of virtue to fit him for a better. It is likewiſe eaſy to perceive why ſome men are better than others, and why ſome are the ſlaves of the moſt criminal paſſions. But all this is unintelligible, upon the ſuppoſition that the ſeeds of every paſſion are innate, and that man is a compound of reaſon and of inſtincts ſo numerous and various as to ſuit every circumſtance in which he can be placed.

If paſſions, whatever be their origin, operate inſtantaneouſly, and if they be formed according to fixed laws, it may be thought a queſtion of very little importance whether they be inſtinctive or acquired.—This was long our own opinion; but we think, that upon maturer reflection we have ſeen reaſon to change it. If paſſions be the reſult of early aſſociations, it is of the utmoſt conſequence that no improper aſſociations be formed in the minds of children, and that none of their unreaſonable deſires be gratified. Upon this theory it ſeems indeed to depend almoſt wholly upon education, whether a child ſhall become a calm, benevolent, ſteady, and upright man; or a paſſionate, capricious, ſelfiſh miſcreant. By teaching him to reſent every petty injury, the ſeeds of iraſcibility are ſown in his mind, and take ſuch root, that before the age of manhood he becomes intolerable to all with whom he muſt converſe. By exciting numberleſs deſires in his youthful mind, and inſtantly gratifying them, you make him capricious and impatient of diſappointment: and by repreſenting other children as in any degree inferior to him, you inſpire him with the hateful paſſion of pride. According to the inſtinctive theory, education can only augment or diminiſh the ſtrength of paſſions; according to the other theory, it is the ſource of by far the greater part of them. On either ſuppoſition, parents ſhould watch with ſolicitude over the actions of their children; but they will ſurely think themſelves obliged to be doubly watchful, if they believe, that through their neglect their children may acquire hateful paſſions, to which, if properly educated, they might have remained ſtrangers through their whole lives. And let it be remembered, that this ſolicitude ſhould begin at an early period; becauſe the mind is ſuſceptible of deep aſſociations much ſooner than is ſometimes imagined. Without this ſuſceptibility, no language could be learned; and therefore a child by the time he learns to ſpeak, may have planted in his mind the ſeeds of paſſions, on the juſt regulation and ſubordination of which depends in a great meaſure the happineſs of mankind. See *Moral Philoſophy*, Part I. chap. 1. & 2. Part III. Nº 216.

Passions and Emotions, difference between them. See *Emotion and Paſſion*.

External Signs of Emotions and Passions. So intimately connected are the ſoul and body, that every agitation in the former produces a viſible effect upon the latter. There is, at the ſame time, a wonderful uniformity in that operation; each claſs of emotions and paſſions being invariably attended with an external appearance peculiar to itſelf. Theſe external appearances, or ſigns, may not improperly be conſidered as a natural language, expreſſing to all beholders emotions and paſſions as they riſe in the heart. Hope, fear, joy, grief, are diſplayed externally: the character of a man can be read in his face; and beauty, which makes ſo deep an impreſſion, is known to reſult, not ſo much from regular features and a fine complexion, as from good nature, good ſenſe, ſprightlineſs, ſweetneſs, or other mental quality, expreſſed upon the countenance. Though perfect ſkill in that language be rare, yet what is generally known is ſufficient for the ordinary purpoſes of life. But by what means we come to underſtand the language, is a point of ſome intricacy. It cannot be by ſight merely; for upon the moſt attentive inſpection of the human viſage, all that can be diſcerned are, figure, colour, and motion, which, ſingly or combined, never can repreſent a paſſion nor a ſentiment: the external ſign is indeed viſible; but to underſtand its meaning, we muſt be able to connect it with the paſſion that cauſes it; an operation far beyond the reach of eye-ſight. Where then is the inſtructor to be found that can unveil this ſecret connexion? If we apply to experience, it is yielded, that from long and diligent obſervation, we may gather, in ſome meaſure, in what manner thoſe we are acquainted with expreſs their paſſions externally; but with reſpect to ſtrangers, we are left in the dark; and yet we are not puzzled about the meaning of theſe external expreſſions in a ſtranger, more than in a boſom companion. Further, Had we no other means but experience for underſtanding the external ſigns of paſſion, we could not expect any uniformity, nor any degree of ſkill, in the bulk of individuals: yet matters are ſo much better ordered, that the external expreſſions of paſſion form a language underſtood by all, by the young as well as the old, by the ignorant as well as the learned: We talk of the plain and legible characters of that language; for undoubtedly we are much indebted to experience, in deciphering the dark and more delicate expreſſions. Where then ſhall we apply for a ſolution of this intricate problem, which ſeems to penetrate deep into human nature? Undoubtedly if the meaning of external ſigns be not derived to us from ſight, nor from experience, there is no remaining ſource whence it can be derived but from nature.

We may then venture to pronounce, with ſome degree of confidence, that man is provided by nature with a ſenſe or faculty that lays open to him every paſſion by means of its external expreſſions. And we cannot entertain any reaſonable doubt of this, when we reflect, that the meaning of external ſigns is not hid even from infants: an infant is remarkably affected with the paſſions of its nurſe expreſſed on her countenance; a ſmile cheers it, a frown makes it afraid: but fear cannot be without apprehending danger; and what danger can the infant apprehend, unleſs it be ſenſible that its nurſe is angry? We muſt therefore admit, that a child can read anger in its nurſe's face; of which it muſt be ſenſible intuitively, for it has no other mean of knowledge. We do not affirm, that theſe particulars are clearly apprehended by the child; for to produce clear and diſtinct perceptions, reflection and experience are requiſite: but that even an infant, when afraid, muſt have ſome notion of its being in danger, is evident.

That we ſhould be conſcious intuitively of a paſſion from its external expreſſions, is conformable to the analogy of nature: the knowledge of that language is of too great importance to be left upon experience; becauſe a foundation ſo uncertain and precarious, would prove a great obſtacle to the formation of ſocieties. Wiſely therefore is it ordered, and agreeably to the ſyſtem of Providence, that we ſhould have nature for our inſtructor.

Such is the philoſophy of Lord Kames, to which objections unanſwerable may be made. It is part of the inſtinctive ſyſtem of metaphyſics, which his lordſhip has carried farther than all who wrote before him, and perhaps farther than all who have ſucceeded him in this department of ſcience. That a child intuitively reads anger in its nurſe's face, is ſo far from being true, that for ſome ſhort time after birth it is not terrified by the moſt menacing geſtures. It is indeed abſolutely incapable of fear till it has ſuffered pain, (ſee INSTINCT); and could we conſtantly careſs it with what is called an *angry look*, it would be cheered by that look, and frightened at a ſmile. It feels, however, the *effects* of anger, and is ſoon capable of obſerving the peculiarity of feature with which that paſſion is uſually accompanied; and theſe two become in a ſhort time ſo linked together in its tender mind, that the appearance of the one neceſſarily ſuggeſts to it the reality of the other.

Should it be ſaid that a loud and ſudden noiſe ſtartles a child immediately after birth, and that, therefore, the infant muſt be inſtinctively afraid, the fact may be admitted, without any neceſſity of admitting the inference. The nerves of an infant are commonly very irritable, and the ſtrong impulſe on the *auditory* nerves may agitate its whole frame, without inſpiring it with the paſſion of fear. The loud noiſe is in all probability not the ſign of approaching danger, but the immediate cauſe of real pain, from which the infant ſhrinks as it would from the prick of a pin or the ſcorching of a candle. But we have ſaid enough in the article immediately preceding, and in others which are there quoted, to ſhow how the paſſions may be formed by aſſociations even in early infancy, and yet operate as if they were inſtinctive. This being the caſe, we ſhall through the remainder of this article ſuffer his lordſhip to ſpeak his own language, without making any further remarks upon it. We are induced to do this for two reaſons; of which the firſt is, that many of our readers will probably prefer his theory to ours; and the ſecond is, that his concluſions reſpecting the ſigns and language of paſſion hold equally good from either theory.

We perfectly agree with him, that manifold and admirable are the purpoſes to which the external ſigns of paſſion are made ſubſervient by the Author of our nature.

1. The ſigns of internal agitation diſplayed externally to every ſpectator, tend to fix the ſignification of many words. The only effectual means to aſcertain the meaning of any doubtful word, is an appeal to the thing it repreſents: and hence the ambiguity of words expreſſive of things that are not objects of external ſenſe; for in that caſe an appeal is denied. Paſſion, ſtrictly ſpeaking, is not an object of external ſenſe: but its external ſigns are: and by means of theſe ſigns, paſſions may be appealed to with tolerable accuracy; thus the words that denote our paſſions, next to thoſe, that denote external objects, have the moſt diſtinct meaning. Words ſignifying internal action and the more delicate feelings, are leſs diſtinct. This defect, with regard to internal action, is what chiefly occaſions the intricacy of logic: the terms of that ſcience are far from being ſufficiently aſcertained, even after much care and labour beſtowed by an eminent writer †; to whom, however, the world is greatly indebted, for removing a mountain of rubbiſh, and moulding the ſubject into a rational and correct form, the ſame defect is remarkable in criticiſm, which has for its object the more delicate feelings; the terms that denote theſe feelings being not more diſtinct than thoſe of logic.

2. Society among individuals is greatly promoted by that univerſal language. Looks and geſtures give direct acceſs to the heart; and lead us to ſelect, with tolerable accuracy, the perſons who are worthy of our confidence. It is ſurpriſing how quickly, and for the moſt part how correctly, we judge of character from external appearance.

3. After ſocial intercourſe is commenced, theſe external ſigns, which diffuſe through a whole aſſembly the feelings of each individual, contribute above all other means to improve the ſocial affections. Language, no doubt is the moſt comprehenſive vehicle for communicating emotions: but in expedition, as well as in power of conviction, it falls ſhort of the ſigns under conſideration; the involuntary ſigns eſpecially, which are incapable of deceit. Where the countenance, the tones, the geſtures, the actions, join with the words in communicating emotions, theſe united have a force irreſiſtible. Thus all the pleaſant emotions of the human heart, with all the ſocial and virtuous affections, are, by means of theſe external ſigns, not only perceived, but felt. By this admirable contrivance, converſation becomes that lively and animating amuſement, without which life would at beſt be inſipid: one joyful countenance ſpreads cheerfulneſs inſtantaneouſly through a multitude of ſpectators.

4. Diſſocial paſſions, being hurtful by prompting violence and miſchief, are noted by the moſt conſpicuous external ſigns, in order to put us upon our guard: thus anger and revenge, eſpecially when ſudden, diſplay themſelves on the countenance in legible characters. The external ſigns, again, of every paſſion that threatens danger, raiſe in us the paſſion of fear: which frequently operating without reaſon or reflection, moves us by a ſudden impulſe to avoid the impending danger.

5. Theſe external ſigns are remarkably ſubſervient to morality. A painful paſſion, being accompanied with diſagreeable external ſigns, muſt produce in every ſpectator a painful emotion: but then, if the paſſion be ſocial, the emotion it produces is attractive, and connects the ſpectator with the perſon who ſuffers. Diſſocial paſſions only are productive of repulſive emotions, involving the ſpectator's averſion, and frequently his indignation. This artful contrivance makes us cling to the virtuous, and abhor the wicked.

6. Of all the external ſigns of paſſion, thoſe of affliction or diſtreſs are the moſt illuſtrious with reſpect to a final cauſe, and deſervedly merit a place of diſtinction. They are illuſtrious by the ſingularity of their contrivance; and alſo by inſpiring ſympathy, a paſſion to which human ſociety is indebted for its greateſt bleſſing, that of providing relief for the diſtreſſed. A ſubject ſo intereſting deſerves a leiſurely and attentive examination. The conformity of the nature of man to his external circumſtance is in every particular wonderful: his nature makes him prone to ſociety; and ſociety is neceſſary to his wellbeing, becauſe in a ſolitary ſtate he is a helpleſs

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† Locke.

being, deſtitute of ſupport, and in his diſtreſſes deſtitute of relief: but mental ſupport, the ſhining attribute of ſociety, is of too great moment to be left dependent upon cool reaſon; it is ordered more wiſely, and with greater conformity to the analogy of nature, that it ſhould be enforced even inſtinctively by the paſſion of ſympathy. Here ſympathy makes a capital figure; and contributes, more than any other means, to make life eaſy and comfortable. But however eſſential the ſympathy of others may be to our wellbeing, one beforehand would not readily conceive how it could be raiſed by external ſigns of diſtreſs; for conſidering the analogy of nature, if theſe ſigns be agreeable, they muſt give birth to a pleaſant emotion leading every beholder to be pleaſed with human woes: if diſagreeable, as they undoubtedly are, ought they not naturally to repel the ſpectator from them, in order to be relieved from pain? Such would be the reaſoning beforehand; and ſuch would be the effect were man purely a ſelfiſh being. But the benevolence of our nature gives a very different direction to the painful paſſion of ſympathy, and to the deſire involved in it: inſtead of avoiding diſtreſs, we fly to it in order to afford relief; and our ſympathy cannot be otherwiſe gratified but by giving all the ſuccour in our power. Thus external ſigns of diſtreſs, though diſagreeable, are attractive; and the ſympathy they inſpire is a powerful cauſe, impelling us to afford relief even to a ſtranger, as if he were our friend or relation.

It is a noted obſervation, that the deepeſt tragedies are the moſt crowded; which in an overly view will be thought an unaccountable bias in human nature. Love of novelty, deſire of occupation, beauty of action, make us fond of theatrical repreſentations; and when once engaged, we muſt follow the ſtory to the concluſion, whatever diſtreſs it may create. But we generally become wiſe by experience; and when we foreſee what pain we ſhall ſuffer during the courſe of the repreſentation, is it not ſurpriſing that perſons of reflection do not avoid ſuch ſpectacles altogether? And yet one who has ſcarce recovered from the diſtreſs of a deep tragedy, reſolves coolly and deliberately to go to the very next, without the ſlighteſt obſtruction from ſelf-love. The whole myſtery is explained by a ſingle obſervation: That ſympathy, though painful, is attractive; and attaches us to an object in diſtreſs, inſtead of promoting us to fly from it. And by this curious mechaniſm it is, that perſons of any degree of ſenſibility are attracted by affliction ſtill more than by joy.

To conclude: the external ſigns of paſſion are a ſtrong indication, that man, by his very conſtitution, is framed to be open and ſincere. A child, in all things obedient to the impulſes of nature, hides none of its emotions; the ſavage and clown, who have no guide but pure nature, expoſe their hearts to view, by giving way to all the natural ſigns. And even when men learn to diſſemble their ſentiments, and when behaviour degenerates into art, there ſtill remain checks, that keep diſſimulation within bounds, and prevent a great part of its miſchievous effects: the total ſuppreſſion of the voluntary ſigns during any vivid paſſion, begets the utmoſt uneaſineſs, which cannot be endured for any conſiderable time: this operation becomes indeed leſs painful by habit; but luckily the involuntary ſigns cannot, by any effort, be ſuppreſſed or even diſſembled. An abſolute hypocriſy, by which the character is concealed and a fictitious one aſſumed, is made impracticable; and nature has thereby prevented much harm to ſociety. We may pronounce, therefore, that Nature, herſelf ſincere and candid, intends that mankind ſhould preſerve the ſame character, by cultivating ſimplicity and truth, and baniſhing every ſort of diſſimulation that tends to miſchief.

Influence of PASSION *with reſpect to our Perceptions, Opinions, and Belief.* So intimately are our perceptions, paſſions, and actions, connected, it would be wonderful if they ſhould have no mutual influence. That our actions are too much influenced by paſſion, is a known truth; but it is not leſs certain, though not ſo well known, that paſſion hath alſo an influence upon our perceptions, opinions, and belief. For example, the opinions we form of men and things are generally directed by affection: An advice given by a man of figure has great weight; the ſame advice from one in a low condition is deſpiſed or neglected: a man of courage underrates danger; and to the indolent the ſlighteſt obſtacle appears unſurmountable. All this may be accounted for by the ſimple principle of aſſociation.

There is no truth more univerſally known, than that tranquillity and ſedateneſs are the proper ſtate of mind for accurate perception and cool deliberation; and for that reaſon, we never regard the opinion even of the wiſeſt man, when we diſcover prejudice or paſſion behind the curtain. Paſſion hath ſuch influence over us, as to give a falſe light to all its objects. Agreeable paſſions prepoſſeſs the mind in favour of their objects; and diſagreeable paſſions, not leſs againſt their objects: A woman is all perfection in her lover's opinion, while in the eye of a rival beauty ſhe is awkward and diſagreeable: when the paſſion of love is gone, beauty vaniſhes with it;—nothing is left of that genteel motion, that ſprightly converſation, thoſe numberleſs graces, which formerly, in the lover's opinion, charmed all hearts. To a zealot every one of his own ſect is a ſaint, while the moſt upright of a different ſect are to him children of perdition: the talent of ſpeaking in a friend, is more regarded than prudent conduct in any other. Nor will this ſurpriſe any one acquainted with the world; our opinions, the reſult frequently of various and complicated views, are commonly ſo ſlight and wavering, as readily to be ſuſceptible of a bias from paſſion.

With that natural bias another circumſtance concurs, to give paſſion an undue influence on our opinions and belief; and that is a ſtrong tendency in our nature to juſtify our paſſions as well as our actions, not to others only, but even to ourſelves. That tendency is peculiarly remarkable with reſpect to diſagreeable paſſions: by its influence, objects are magnified or leſſened, circumſtances ſupplied or ſuppreſſed, every thing coloured and diſguiſed, to anſwer the end of juſtification. Hence the foundation of ſelf-deceit, where a man impoſes upon himſelf innocently, and even without ſuſpicion of a bias.

We proceed to illuſtrate the foregoing obſervations by proper examples.

Gratitude, when warm, is often exerted upon the children of the benefactor; eſpecially where he is removed out of reach by death or abſence. The paſſion in this caſe being exerted for the ſake of the benefactor, requires no peculiar excellence in his children: but the practice of doing good to theſe children produces affection for them, which never fails to advance them in our eſteem. By ſuch means, ſtrong connections of affection are often formed among individuals, upon the ſlight foundation now mentioned.

Envy is a paſſion, which, being altogether unjuſtifiable, cannot be excuſed but by diſguiſing it under ſome plauſible name. At the ſame time, no paſſion is more eager than envy to give its object a diſagreeable appearance: it magnifies every bad quality, and fixes on the moſt humiliating circumſtances:

Caſſius. I cannot tell what you and other men
Think of this life; but for my ſingle ſelf,
I had as lief not be, as live to be
In awe of ſuch a thing as I myſelf.
I was born free as Cæſar, ſo were you;
We both have fed as well, and we can both
Endure the winter's cold as well as he.
For once, upon a raw and guſty day,
The troubled Tyber chafing with his ſhores,
Cæſar ſays to me, Dar'ſt thou, Caſſius, now
Leap in with me into this angry flood,
And ſwim to yonder point?—Upon the word,
Accoutred as I was, I plunged in,
And bid him follow; ſo indeed he did.
The torrent roar'd, and we did buffet it
With luſty ſinews; throwing it aſide,
And ſtemming it with hearts of controverſy.
But ere we could arrive the point propos'd,
Cæſar cry'd, Help me, Caſſius, or I ſink.
I, as Æneas, our great anceſtor,
Did from the flames of Troy upon his ſhoulder
The old Anchiſes bear; ſo from the waves of Tyber
Did I the tired Cæſar: and this man
Is now become a god; and Caſſius is
A wretched creature, and muſt bend his body
If Cæſar careleſsly but nod on him.
He had a fever when he was in Spain;
And when the fit was on him, I did mark
How he did ſhake. 'Tis true, this god did ſhake;
His coward lips did from their colour fly;
And that ſame eye whoſe bend doth awe the world
Did loſe its luſtre: I did hear him groan;
Ay, and that tongue of his, that bade the Romans
Mark him, and write his ſpeeches in their books,
Alas! it cry'd—Give me ſome drink, Titinius,—
As a ſick girl. Ye Gods, it doth amaze me,
A man of ſuch a feeble temper ſhould
So get the ſtart of the majeſtic world,
And bear the palm alone. *Julius Cæſar*, act. ii. ſc. 3.

Glo'ſter, inflamed with reſentment againſt his ſon Edgar, could even force himſelf into a momentary conviction that they were not related:

O ſtrange faſten'd villain!
Would he deny his letter?—I never got him.
King Lear, act ii. ſc. 3.

When by great ſenſibility of heart, or other means, grief becomes immoderate, the mind, in order to juſtify itſelf, is prone to magnify the cauſe; and if the real cauſe admit not of being magnified, the mind ſeeks a cauſe for its grief in imagined future events:

Buſhy. Madam, your majeſty is much too ſad:
You promis'd, when you parted with the king,
To lay aſide ſelf-harming heavineſs,
And entertain a cheerful diſpoſition.
Queen. To pleaſe the king, I did; to pleaſe myſelf,
I cannot do it. Yet I know no cauſe
Why I ſhould welcome ſuch a gueſt as grief;
Save bidding farewell to ſo ſweet a gueſt
As my ſweet Richard: yet again, methinks,
Some unborn ſorrow, ripe in Fortune's womb,
Is coming tow'rd me; and my inward ſoul
With ſomething trembles, yet at nothing grieves,
More than with parting from my lord the king.
Richard II. act ii. ſc. 5.

Reſentment at firſt is vented on the relations of the offender, in order to puniſh him; but as reſentment, when ſo outrageous, is contrary to conſcience, the mind, to juſtify its paſſion, is diſpoſed to paint theſe relations in the blackeſt colours; and it comes at laſt to be convinced, that they ought to be puniſhed for their own demerits.

Anger, raiſed by an accidental ſtroke upon a tender part of the body, is ſometimes vented upon the undeſigning cauſe. But as the paſſion in that caſe is abſurd, and as there can be no ſolid gratification in puniſhing the innocent, the mind, prone to juſtify as well as to gratify its paſſion, deludes itſelf into a conviction of the action's being voluntary. The conviction, however, is but momentary; the firſt reflection ſhows it to be erroneous: and the paſſion vaniſheth almoſt inſtantaneouſly with the conviction. But anger, the moſt violent of all paſſions, has ſtill greater influence: it ſometimes forces the mind to perſonify a ſtock or a ſtone if it happen to occaſion bodily pain, and even to believe it a voluntary agent, in order to be a proper object of reſentment. And that we have really a momentary conviction of its being a voluntary agent, muſt be evident from conſidering, that without ſuch conviction the paſſion can neither be juſtified nor gratified: the imagination can give no aid; for a ſtock or a ſtone imagined inſenſible, cannot be an object of puniſhment, if the mind be conſcious that it is an imagination merely without any reality (A). Of ſuch perſonification, involving a conviction of reality, there is one illuſtrious inſtance. When the firſt bridge of boats over the Helleſpont was deſtroyed by a ſtorm, Xerxes fell into a tranſport of rage, ſo exceſſive, that he commanded the ſea to be puniſhed with 300 ſtripes; and a pair of fetters to be thrown into it, enjoining the following words to be pronounced: "O thou ſalt and bitter water! thy maſter hath condemned thee to this puniſhment for offending him without cauſe; and is reſolved

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(A) We have already ſhown how a man may be inſtigated to wreak his vengeance on a ſtock or a ſtone, without ever conſidering whether it be ſenſible or inſenſible: (See PASSION). If the ſtory of Xerxes be true, he may have conſidered the ſea as ſenſible and animated, without dreaming that a ſtock or a ſtone is ſo. The ſea was a god among many of the pagans, and was conſidered as ſuch by Xerxes, otherwiſe he could not have applauded men for not ſacrificing to it.

reſolved to paſs over thee in deſpite of thy inſolence: with reaſon all men neglect to ſacrifice to thee, becauſe thou art both diſagreeable and treacherous."

Shakeſpeare exhibits beautiful examples of the irregular influence of paſſion in making us believe things to be otherwiſe than they are. King Lear, in his diſtreſs, perſonifies the rain, wind, and thunder; and in order to juſtify his reſentment, believes them to be taking part with his daughters:

Lear. Rumble thy bellyful, ſpit fire, ſpout rain!
Nor rain, wind, thunder, fire, are my daughters.
I tax not you, ye elements, with unkindneſs;
I never gave you kingdoms, call'd you children;
You owe me no ſubſcription. Then let fall
Your horrible pleaſure.—Here I ſtand, your brave;
A poor, infirm, weak, and deſpis'd old man!
But yet I call you ſervile miniſters,
That have with two pernicious daughters join'd
Your high-engender'd battles 'gainſt a head
So old and white as this. Oh! oh! 'tis foul!
Act iii. ſc. 2.

King Richard, full of indignation againſt his favourite horſe for carrying Bolingbroke, is led into the conviction of his being rational:

Groom. O, how it yearn'd my heart, when I beheld
In London ſtreets, that coronation-day,
When Bolingbroke rode on Roan Barbary,
That horſe that thou ſo often haſt beſtrid,
That horſe that I ſo carefully have dreſſed.
K. Rich. Rode he on Barbary? tell me, gentle friend,
How went he under him?
Groom. So proudly as he had diſdain'd the ground.
K. Rich. So proud that Bolingbroke was on his back!
That jade had eat bread from my royal hand.
This hand hath made him proud with clapping him.
Would he not ſtumble? would he not fall down,
(Since pride muſt have a fall), and break the neck
Of that proud man that did uſurp his back?
Richard II. act v. ſc. 11.

Hamlet, ſwelled with indignation at his mother's ſecond marriage, was ſtrongly inclined to leſſen the time of her widowhood, the ſhortneſs of the time being a violent circumſtance againſt her; and he deludes himſelf by degrees into the opinion of an interval ſhorter than the real one:

Hamlet. ———————That it ſhould come to this!
But two months dead! nay, not ſo much; not two—
So excellent a king, that was, to this,
Hyperion to a ſatyr: ſo loving to my mother,
That he permitted not the wind of heav'n
Viſit her face too roughly. Heav'n and earth!
Muſt I remember—why, ſhe would hang on him,
As if increaſe of appetite had grown
By what it fed on: yet, within a month——
Let me not think—Frailty, thy name is *Woman!*
A little month! or ere thoſe ſhoes were old,
With which ſhe follow'd my poor father's body,
Like Niobe, all tears——why ſhe, ev'n ſhe—
(O heav'n! a beaſt, that wants diſcourſe of reaſon,
Wou'd have mourn'd longer) married with mine uncle,
My father's brother; but no more like my father
Than I to Hercules. Within a month!—
Ere yet the ſalt of moſt unrighteous tears
Had left the fluſhing in her galled eyes,
She married——Oh, moſt wicked ſpeed! to poſt
With ſuch dexterity to inceſtuous ſheets!
It is not, nor it cannot, come to good.
But break, my heart, for I muſt hold my tongue.
Act i. ſc. 3.

The power of paſſion to falſify the computation of time is remarkable in this inſtance; becauſe time, having an accurate meaſure, is leſs obſequious to our deſires and wiſhes, than objects which have no preciſe ſtandard of magnitude.

Good news are greedily ſwallowed upon very ſlender evidence; our wiſhes magnify the probability of the event, as well as the veracity of the relater; and we believe as certain what at beſt is doubtful:

Quel, che l'huom vede, amor li fa inviſible
E l' inviſibil fa veder amore.
Queſto creduto fu, che 'l miſer ſuole
Dar facile credenza a' quel, che vuole.
Orland. Furioſ. cant. 1. ſt. 56.

For the ſame reaſon, bad news gain alſo credit upon the ſlighteſt evidence: fear, if once alarmed, has the ſame effect with hope, to magnify every circumſtance that tends to conviction. Shakeſpeare, who ſhows more knowledge of human nature than any of our philoſophers, hath in his Cymbeline repreſented this bias of the mind; for he makes the perſon who alone was affected with the bad news, yield to evidence that did not convince any of his companions. And Othello is convinced of his wife's infidelity from circumſtances too ſlight to move any perſon leſs intereſted.

If the news intereſt us in ſo low a degree as to give place to reaſon, the effect will not be altogether the ſame: judging of the probability or improbability of the ſtory, the mind ſettles in a rational conviction either that it is true or not. But even in that caſe, the mind is not allowed to reſt in that degree of conviction which is produced by rational evidence: if the news be in any degree favourable, our belief is raiſed by hope to an improper height; and if unfavourable, by fear.

This obſervation holds equally with reſpect to future events: if a future event be either much wiſhed or dreaded, the mind never fails to augment the probability beyond truth.

That eaſineſs of belief, with reſpect to wonders and prodigies, even the moſt abſurd and ridiculous, is a ſtrange phenomenon; becauſe nothing can be more evident than the following propoſition, That the more ſingular any event is, the more evidence is required to produce belief: a familiar event daily occurring, being in itſelf extremely probable, finds ready credit, and therefore is vouched by the ſlighteſt evidence; but to overcome the improbability of a ſtrange and rare event, contrary to the courſe of nature, the very ſtrongeſt evidence is required. It is certain, however, that wonders and prodigies are ſwallowed by the vulgar, upon evidence that would not be ſufficient to aſcertain the moſt familiar occurrence. It has been reckoned difficult to explain that irregular bias of mind; but we are now made acquainted with the influence of paſſion upon opinion and belief; a ſtory of ghoſts or fairies, told with an air of gravity and truth, raiſeth an emotion of wonder, and perhaps of dread; and theſe emotions impoſing on a weak mind, impreſs upon it a thorough conviction contrary to reaſon.

Opinion and belief are influenced by propenſity as well as by paſſion. An innate propenſity is all we have to convince us that the operations of nature are uniform: influenced by that propenſity, we often raſhly think, that good or bad weather will never have an end; and in natural philoſophy, writers, influenced by the ſame propenſity, ſtretch commonly their analogical reaſonings beyond juſt bounds. See METAPHYSICS, Nº 133, 134.

Opinion and belief are influenced by affection as well as by propenſity. The noted ſtory of a fine lady and a curate viewing the moon through a teleſcope is a pleaſant illuſtration: "I perceive (ſays the lady) two ſhadows inclining to each other; they are certainly two happy lovers:" "Not at all (replies the curate), they are two ſteeples of a cathedral."

Language of PASSION. Among the particulars that compoſe the ſocial part of our nature, a propenſity to communicate our opinions, our emotions, and every thing that affects us, is remarkable. Bad fortune and injuſtice affect us greatly; and of theſe we are ſo prone to complain, that if we have no friend or acquaintance to take part in our ſufferings, we ſometimes utter our complaints aloud, even where there are none to liſten.

But this propenſity operates not in every ſtate of mind. A man immoderately grieved, ſeeks to afflict himſelf, rejecting all conſolation: immoderate grief accordingly is mute; complaining is ſtruggling for conſolation.

It is the wretch's comfort ſtill to have
Some ſmall reſerve of near and inward wo,
Some unſuſpected hoard of inward grief,
Which they unſeen may wail, and weep, and mourn,
And glutton-like alone devour.

Mourning Bride, act i. ſc. 1.

When grief ſubſides, it then, and no ſooner, finds a tongue: we complain, becauſe complaining is an effort to diſburden the mind of its diſtreſs. This obſervation is finely illuſtrated by a ſtory which Herodotus records, book iii. Cambyſes, when he conquered Egypt, made Pſammeticus the king priſoner; and for trying his conſtancy, ordered his daughter to be dreſſed in the habit of a ſlave, and to be employed in bringing water from the river; his ſon alſo was led to execution with a halter about his neck. The Egyptians vented their ſorrow in tears and lamentations: Pſammeticus only, with a downcaſt eye, remained ſilent. Afterward meeting one of his companions, a man advanced in years, who, being plundered of all, was begging alms, he wept bitterly, calling him by his name. Cambyſes, ſtruck with wonder, demanded an anſwer to the following queſtion: "Pſammeticus, thy maſter Cambyſes is deſirous to know, why, after thou hadſt ſeen thy daughter ſo ignominiouſly treated, and thy ſon led to execution, without exclaiming or weeping, thou ſhouldſt be ſo highly concerned for a poor man noway related to thee?" Pſammeticus returned the following anſwer: "Son of Cyrus, the calamities of my family are too great to leave me the power of weeping; but the misfortunes of a companion, reduced in his old age to want of bread, is a fit ſubject for lamentation."

Surpriſe and terror are ſilent paſſions, for a different reaſon: they agitate the mind ſo violently, as for a time to ſuſpend the exerciſe of its faculties, and among others the faculty of ſpeech.

Love and revenge, when immoderate, are not more loquacious than immoderate grief. But when theſe paſſions become moderate, they ſet the tongue free, and, like moderate grief, become loquacious. Moderate love, when unſucceſsful, is vented in complaints; when ſucceſsful, is full of joy expreſſed by words and geſtures.

As no paſſion hath any long uninterrupted exiſtence, nor beats always with an equal pulſe, the language ſuggeſted by paſſion is not only unequal but frequently interrupted; and even during an uninterrupted fit of paſſion, we only expreſs in words the more capital ſentiments. In familiar converſation, one who vents every ſingle thought, is juſtly branded with the character of *loquacity*; becauſe ſenſible people expreſs no thoughts but what make ſome figure: in the ſame manner, we are only diſpoſed to expreſs the ſtrongeſt impulſes of paſſion, eſpecially when it returns with impetuoſity after interruption.

It is elſewhere obſerved * that the ſentiments ought to be tuned to the paſſion, and the language to both. Elevated ſentiments require elevated language: tender ſentiments ought to be clothed in words that are ſoft and flowing: when the mind is depreſſed with any paſſion, the ſentiments muſt be expreſſed in words that are humble, not low. Words being intimately connected with the ideas they repreſent, the greateſt harmony is required between them: to expreſs, for example, an humble ſentiment in high-ſounding words, is diſagreeable by a diſcordant mixture of feelings; and the diſcord is not leſs when elevated ſentiments are dreſſed in low words:

Verſibus exponi tragicis res comica non vult.
Indignatur item privatis ac prope ſocco
Dignis carminibus narrari cœna Thyeſtæ.

HORAT. *Ars Poet.* l. 89.

This, however, excludes not figurative expreſſion, which, within moderate bounds, communicates to the ſentiment an agreeable elevation. We are ſenſible of an effect directly oppoſite, where figurative expreſſion is indulged beyond a juſt meaſure: the oppoſition between the expreſſion and the ſentiment makes the diſcord appear greater than it is in reality.

At the ſame time, figures are not equally the language of every paſſion: pleaſant emotions, which elevate or ſwell the mind, vent themſelves in ſtrong epithets and figurative expreſſion; but humbling and diſpiriting paſſions affect to ſpeak plain:

Et tragicus plerumque dolet ſermone pedeſtri.
Telephus et Peleus, cum pauper et exul uterque,
Projicit ampullas et ſeſquipedalia verba,
Si curat cor ſpectantis tetigiſſe querela.

HORAT. *Ars Poet.* 95.

Figurative expreſſion, being the work of an enlivened imagination, cannot be the language of anguiſh or diſtreſs. Otway, ſenſible of this, has painted a ſcene of diſtreſs in colours finely adapted to the ſubject: there is ſcarcely

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* See the article *Sentiments.*

Paſſion.

ſcarcely a figure in it, except a ſhort and natural ſimile with which the ſpeech is introduced. Belvidera, talking to her father of her huſband:

Think you ſaw what paſt at our laſt parting;
Think you beheld him like a raging lion,
Pacing the earth, and tearing up his ſteps,
Fire in his eyes, and roaring with the pain
Of burning fury; think you ſaw his one hand
Fix'd on my throat, while the extended other
Graſp'd a keen threat'ning dagger: oh, 'twas thus
We laſt embrac'd, when, trembling with revenge,
He dragg'd me to the ground, and at my boſom
Preſented horrid death; cry'd out, My friends!
Where are my friends? ſwore, wept, rag'd, threaten'd, lov'd;
For he yet lov'd, and that dear love preſerv'd me
To this laſt trial of a father's pity.
I fear not death, but cannot bear a thought
That that dear hand ſhould do th' unfriendly office.
If I was ever then your care, now hear me;
Fly to the ſenate, ſave the promis'd lives
Of his dear friends, ere mine be made the ſacrifice.
Venice Preſerv'd, act v.

To preſerve the foreſaid reſemblance between words and their meaning, the ſentiments of active and hurrying paſſions ought to be dreſſed in words where ſyllables prevail that are pronounced ſhort or faſt; for theſe make an impreſſion of hurry and precipitation. Emotions, on the other hand, that reſt upon their objects, are beſt expreſſed by words where ſyllables prevail that are pronounced long or ſlow. A perſon affected with melancholy, has a languid and ſlow train of perceptions. The expreſſion beſt ſuited to that ſtate of mind, is where words, not only of long, but of many ſyllables, abound in the compoſition; and for that reaſon, nothing can be finer than the following paſſage:

In thoſe deep ſolitudes, and awful cells,
Where heav'nly-penſive Contemplation dwells,
And ever-muſing Melancholy reigns.
POPE, *Eloiſa to Abelard.*

To preſerve the ſame reſemblance, another circumſtance is requiſite, that the language, like the emotion, be rough or ſmooth, broken or uniform. Calm and ſweet emotions are beſt expreſſed by words that glide ſoftly: ſurpriſe, fear, and other turbulent paſſions, require an expreſſion both rough and broken.

It cannot have eſcaped any diligent inquirer into nature, that, in the hurry of paſſion, one generally expreſſes that thing firſt which is moſt at heart; which is beautifully done in the following paſſage:

Me, me; adſum qui feci: in me convertite ferrum,
O Rutuli, mea fraus omnis. *Æneid.* ix. 427.

Paſſion has often the effect of redoubling words, the better to make them expreſs the ſtrong conception of the mind. This is finely imitated in the following examples.

——————Thou ſun, ſaid I, fair light!
And thou enlighten'd earth, ſo freſh and gay!
Ye hills and dales, ye rivers, woods, and plains!
And ye that live, and move, fair creatures! tell,
Tell, if ye ſaw, how came I thus, how here.—
Paradiſe Loſt, viii. 273.

——————Both have ſinn'd! but thou
Againſt God only: I, 'gainſt God and thee.
And to the place of judgement will return;
There with my cries importune Heav'n, that all
The ſentence, from thy head remov'd, may light
On me, ſole cauſe to thee of all this wo;
Me! me! only juſt object of his ire.
Paradiſe Loſt, x. 930.

In general, the language of violent paſſion ought to be broken and interrupted. Soliloquies ought to be ſo in a peculiar manner: language is intended by nature for ſociety; and a man when alone, though he always clothes his thoughts in words, ſeldom gives his words utterance, unleſs when prompted by ſome ſtrong emotion; and even then by ſtarts and intervals only. Shakeſpeare's ſoliloquies may be juſtly eſtabliſhed as a model; for it is not eaſy to conceive any model more perfect. Of his many incomparable ſoliloquies, the two following only ſhall be quoted, being different in their manner.

Hamlet. Oh, that this too, too ſolid fleſh would melt,
Thaw, and reſolve itſelf into a dew!
Or that the Everlaſting had not fix'd
His canon 'gainſt ſelf-ſlaughter! O God! O God!
How weary, ſtale, flat, and unprofitable,
Seem to me all the uſes of this world!
Fie on't! O fie! 'tis an unweeded garden,
That grows to ſeed: things rank and groſs in nature
Poſſeſs it merely.——That it ſhould come to this!
But two months dead! nay, not ſo much; not two—
So excellent a king, that was, to this,
Hyperion to a ſatyr: ſo loving to my mother,
That he permitted not the winds of heav'n
Viſit her face too roughly. Heav'n and earth!
Muſt I remember—why, ſhe would hang on him,
As if increaſe of appetite had grown
By what it fed on: yet, within a month——
Let me not think—Frailty, thy name is *Woman!*
A little month! or ere thoſe ſhoes were old,
With which ſhe follow'd my poor father's body,
Like Niobe, all tears——why ſhe, ev'n ſhe——
(O heav'n! a beaſt, that wants diſcourſe of reaſon,
Would have mourn'd longer—) married with mine uncle,
My father's brother; but no more like my father
Than I to Hercules. Within a month!——
Ere yet the ſalt of moſt unrighteous tears
Had left the fluſhing in her galled eyes,
She married——Oh, moſt wicked ſpeed, to poſt
With ſuch dexterity to inceſtuous ſheets!
It is not, nor it cannot come to good.
But break, my heart, for I muſt hold my tongue.
Hamlet, act i. ſc. 3.

" *Ford.* Hum! ha! is this a viſion? is this a dream?
" do I ſleep? Mr Ford, awake; awake, Mr Ford;
" there's a hole made in your beſt coat, Mr Ford! this
" 'tis to be married! this 'tis to have linen and buck
" baſkets! Well, I will proclaim myſelf what I am;

"I will now take the leacher; he is at my houſe; "he cannot 'ſcape me; 'tis impoſſible he ſhould; he "cannot creep into a halfpenny purſe, nor into a pepper-"box. But leſt the devil that guides him ſhould aid "him, I will ſearch impoſſible places; tho' what I am "I cannot avoid, yet to be what I would not, ſhall not "make me tame."

Merry Wives of Windſor, act iii. ſc. laſt.

Theſe ſoliloquies are accurate and bold copies of nature: in a paſſionate ſoliloquy one begins with thinking aloud, and the ſtrongeſt feelings only are expreſſed; as the ſpeaker warms, he begins to imagine one liſtening, and gradually ſlides into a connected diſcourſe.

How far diſtant are ſoliloquies generally from theſe models? So far indeed as to give diſguſt inſtead of pleaſure. The firſt ſcene of Iphigenia in Tauris diſcovers that princeſs, in a ſoliloquy, gravely reporting to herſelf her own hiſtory. There is the ſame impropriety in the firſt ſcene of Alceſtes, and in the other introductions of Euripides, almoſt without exception. Nothing can be more ridiculous; it puts one in mind of a moſt curious device in Gothic paintings, that of making every figure explain itſelf by a written label iſſuing from its mouth. The deſcription which a paraſite, in the Eunuch of Terence (act ii. ſc. 2.) gives of himſelf, makes a ſprightly ſoliloquy: but it is not conſiſtent with the rules of propriety; for no man, in his ordinary ſtate of mind and upon a familiar ſubject, ever thinks of talking aloud to himſelf. The ſame objection lies againſt a ſoliloquy in the Adelphi of the ſame author (act i. ſc. 1.). The ſoliloquy which makes the third ſcene, act third of his *Hecyra*, is inſufferable; for there Pamphilus, ſoberly and circumſtantially, relates to himſelf an adventure which had happened to him a moment before.

Corneille is unhappy in his ſoliloquies: Take for a ſpecimen the firſt ſcene of Cinna.

Racine is extremely faulty in the ſame reſpect. His ſoliloquies are regular harangues, a chain completed in every link, without interruption or interval: that of Antiochus in Berenice (act i. ſc. 2.) reſembles a regular pleading, where the parties *pro* and *con* diſplay their arguments at full length. The following ſoliloquies are equally faulty: *Bajazet*, act iii. ſc. 7.; *Mithridate*, act iii. ſc. 4. and act iv. ſc. 5.; *Iphigenia*, act iv. ſc. 8.

Soliloquies upon lively or intereſting ſubjects, but without any turbulence of paſſion, may be carried on in a continued chain of thought. If, for example, the nature and ſprightlineſs of the ſubject prompt a man to ſpeak his thoughts in the form of a dialogue, the expreſſion muſt be carried on without break or interruption, as in a dialogue between two perſons; which juſtifies Falſtaff's ſoliloquy upon honour:

"What need I be ſo forward with Death, that calls "not on me? Well, 'tis no matter, Honour pricks me "on. But how if Honour prick me off, when I come "on? how then? Can honour ſet a leg? No. Or an "arm? No. Or take away the grief of an wound? "No. Honour hath no ſkill in ſurgery then? No. "What is Honour? A word.—What is that word *honour?* Air; a trim reckoning.—Who hath it? He "that dy'd a Wedneſday. Doth he feel it? No. "Doth he hear it? No. Is it inſenſible then? Yea, "to the dead. But will it not live with the living? "No. Why? Detraction will not ſuffer it. Therefore "I'll none of it: honour is a mere ſcutcheon: and ſo "ends my catechiſm."

Firſt Part, Henry IV. act v. ſc. 2.

And even without dialogue a continued diſcourſe may be juſtified, where a man reaſons in a ſoliloquy upon an important ſubject; for if in ſuch a caſe it be at all excuſable to think aloud, it is neceſſary that the reaſoning be carried on in a chain; which juſtifies that admirable ſoliloquy in *Hamlet* upon life and immortality, being a ſerene meditation upon the moſt intereſting of all ſubjects. And the ſame conſideration will juſtify the ſoliloquy that introduces the 5th act of Addiſon's *Cato.*

Language ought not to be elevated above the tone of the ſentiment.

Zara. Swift as occaſion I
Myſelf will fly; and earlier than the morn
Wake thee to freedom. Now 'tis late; and yet
Some news few minutes paſt arriv'd, which ſeem'd
To ſhake the temper of the king——Who knows
What racking cares diſeaſe a monarch's bed?
Or love, that late at night ſtill lights his lamp,
And ſtrikes his rays through duſk, and folded lids,
Forbidding reſt, may ſtretch his eyes awake,
And force their balls abroad at this dead hour.
I'll try.

Mourning Bride, act iii. ſc. 4.

The language here is undoubtedly too pompous and laboured for deſcribing ſo ſimple a circumſtance as abſence of ſleep. In the following paſſage, the tone of the language, warm and plaintive, is well ſuited to the paſſion, which is recent grief: but every one will be ſenſible, that in the laſt couplet ſave one the tone is changed, and the mind ſuddenly elevated to be let fall as ſuddenly in the laſt couplet:

Il déteſte à jamais ſa coupable victoire,
Il renonce à la cour, aux humains, à la gloire;
Et ſe fuiant lui-même, au milieu des deſerts,
Il va cacher ſa peine au bout de l'univers;
Là, ſoit que le ſoleil rendit le jour au monde,
Soit qu'il finit ſa courſe au vaſte ſein de l'onde,
Sa voix faiſoit redire aux echos attendris,
Le nom, le triſte nom, de ſon malheureux fils.

Henriade, chant. viii. 229.

Light and airy language is unſuitable to a ſevere paſſion.

Imagery and figurative expreſſion are diſcordant, in the higheſt degree, with the agony of a mother, who is deprived of two hopeful ſons by a brutal murder. Therefore the following paſſage is undoubtedly in a bad taſte:

Queen. Ah, my poor princes! ah, my tender babes!
My unblown flowers, new appearing ſweets!
If yet your gentle ſouls fly in the air,
And be not fixt in doom perpetual,
Hover about me with your airy wings,
And hear your mother's lamentation.

Richard III. act iv. ſc. 4.

Again:

K. Philip. You are as fond of grief as of your child.
Conſtance. Grief fills the room up of my abſent child,
Lies

Lies in his bed, walks up and down with me,
Puts on his pretty looks, repeats his words,
Remembers me of all his gracious parts,
Stuffs out his vacant garment with his form;
Then have I reaſon to be fond of grief.
K. John, act iii. ſc. 9.

Thoughts that turn upon the expreſſion inſtead of the ſubject, commonly called *a play of words*, being low and childiſh, are unworthy of any compoſition, whether gay or ſerious, that pretends to any degree of elevation.

In the *Amynta* of Taſſo, the lover falls into a mere play of words, demanding how he who had loſt himſelf, could find a miſtreſs. And for the ſame reaſon, the following paſſage in Corneille has been generally condemned:

Chimene. Mon pere eſt mort, Elvire, et la premiere épée
Dont s'eſt armée Rodrigue a ſa trame coupée.
Pleurez, pleurez, mes yeux, et fondez-vous en eaux,
La moitié de ma vie a mis l'autre au tombeau,
Et m'oblige à venger, après ce coup funeſte,
Celle que je n'ai plus, ſur celle que me reſte.
Cid, act iii. ſc. 3.

To die is to be baniſh'd from myſelf:
And Sylvia is myſelf: baniſh'd from her,
Is ſelf from ſelf; a deadly baniſhment!
Two Gentlemen of Verona, act iii. ſc. 3.

Counteſs. I pray thee, Lady, have a better cheer:
If thou engroſſeſt all the griefs as thine,
Thou robb'ſt me of a moiety.
All's well that ends well, act iii. ſc. 3.

K. Henry. O my poor kingdom, ſick with civil blows!
When that my care could not withhold thy riots,
What wilt thou do when riot is thy care?
O, thou wilt be a wilderneſs again,
Peopled with wolves, thy old inhabitants.
Second Part, Henry IV. act iv. ſc. 11.

Cruda Amarilli, che col nome ancora
D'amar, ahi laſſo, amaramente inſegni.
Paſtor Fido, act i. ſc. 2.

Antony, ſpeaking of Julius Cæſar:

O world! thou waſt the foreſt of this hart;
And this, indeed, O world, the heart of thee.
How like a deer, ſtricken by many princes,
Doſt thou here lie! *Julius Cæſar*, act iii. ſc. 3.

Playing thus with the ſound of words, which is ſtill worſe than a pun, is the meaneſt of all conceits. But Shakeſpeare, when he deſcends to a play of words, is not always in the wrong; for it is done ſometimes to denote a peculiar character, as in the following paſſage:

K. Philip. What ſay'ſt thou, boy? look in the lady's face.
Lewis. I do, my Lord, and in her eye I find
A wonder, or a wond'rous miracle;
The ſhadow of myſelf form'd in her eye;
Which being but the ſhadow of your ſon,
Becomes a ſon, and makes your ſon a ſhadow.
I do proteſt, I never lov'd myſelf
Till now infixed I beheld myſelf
Drawn in the flatt'ring table of her eye.
Faulconbridge. Drawn in the flatt'ring table of her eye!
Hang'd in the frowning wrinkle of her brow!
And quarter'd in her heart! he doth eſpy
Himſelf Love's traitor: this is pity now,
That hang'd, and drawn, and quarter'd there ſhould be.
In ſuch a love ſo vile a lout as he.
King John, act ii. ſc. 5.

A jingle of words is the loweſt ſpecies of that low wit, which is ſcarcely ſufferable in any caſe, and leaſt of all in an heroic poem: and yet Milton in ſome inſtances has deſcended to that puerility:

And brought into the world a world of wo.
——Begirth th' Almighty throne
Beſeeching or beſieging——
Which tempted our attempt——
At one ſlight bound high overleap'd all bound.
——————————With a ſhout
Loud as from numbers without number.

One ſhould think it unneceſſary to enter a caveat againſt an expreſſion that has no meaning, or no diſtinct meaning; and yet ſomewhat of that kind may be found even among good writers.

Sebaſtian. I beg no pity for this mould'ring clay.
For if you give it burial, there it takes
Poſſeſſion of your earth:
If burnt and ſcatter'd in the air; the winds
That ſtrow my duſt, diffuſe my royalty,
And ſpread me o'er your clime; for where one atom
Of mine ſhall light, know there Sebaſtian reigns.
DRYDEN, *Don Sebaſtian King of Portugal*, act i.

Cleopatra. Now, what news, my Charmion?
Will he be kind? and will he not forſake me?
Am I to live or die? nay, do I live?
Or am I dead? for when he gave his anſwer,
Fate took the word, and then I liv'd or dy'd.
DRYDEN, *All for Love*, act ii.

If ſhe be coy, and ſcorn my noble fire,
If her chill heart I cannot move;
Why, I'll enjoy the very love,
And make a miſtreſs of my own deſire.
COWLEY, *poem inſcribed* "The Requeſt."

His whole poem inſcribed *My Picture* is a jargon of the ſame kind.

——————'Tis he, they cry, by whom
Not men, but war itſelf is overcome.
Indian Queen.

Such empty expreſſions are finely ridiculed in the *Rehearſal.*

Was't not unjuſt to raviſh hence her breath,
And in life's ſtead to leave us nought but death?
Act iv. ſc. 1.

PASSIONS, in *Medicine*, make one of the non-naturals, and produce very ſenſible effects. Joy, anger, and fear, are the principal. In the two firſt, the ſpirits are hurried with too great vivacity; whereas, in fear or dread, they are as it were curled and concentrated: whence we may conclude, that they have a very bad effect upon health; and therefore it will be beſt to keep them within bounds as much as poſſible, and to preſerve an inward ſerenity, calmneſs, and tranquillity.

Passions, in *Painting*, are the external expreſſions of the different diſpoſitions and affections of the mind; but particularly their different effects upon the ſeveral features of the face: for though the arms, and indeed every part of the body *, ſerve likewiſe, by their quick, languid, and variouſly diverſified motions, to expreſs the paſſions of the ſoul; yet, in painting, this difference is moſt conſpicuous in the face. See Painting, and Drawing, § 8.

* See Oratory, N° 23 37.

As we have given engravings of Le Brun's drawings of the paſſions, we ſhall here ſubjoin the account which he has given of each of theſe heads.

Plates CCCCV, and CCCCVI.

1. The effects of *attention* are, to make the eyebrows ſink and approach the ſides of the noſe; to turn the eyeballs toward the object that cauſes it; to open the mouth, and eſpecially the upper part; to decline the head a little, and fix it without any other remarkable alteration.

2. *Admiration* cauſes but little agitation in the mind, and therefore alters but very little the parts of the face; nevertheleſs the eyebrow riſes; the eye opens a little more than ordinary; the eyeball placed equally between the eyelids appears fixed on the object; the mouth half opens, and makes no ſenſible alteration in the cheeks.

3. The motions that accompany *admiration with aſtoniſhment* are hardly different from thoſe of ſimple admiration, only they are more lively and ſtronger marked; the eyebrows more elevated; the eyes more open; the eyeball further from the lower eyelid, and more ſteadily fixed: The mouth is more open, and all the parts in a much ſtronger emotion.

4. Admiration begets eſteem, and this produces *veneration*, which, when it has for its object ſomething divine or beyond our comprehenſion, makes the face decline, and the eyebrows bend down; the eyes are almoſt ſhut and fixed: the mouth is ſhut. Theſe motions are gentle, and produce but little alteration in the other parts.

5. Although *rapture* has the ſame object as veneration, only conſidered in a different manner, its motions are not the ſame; the head inclines to the left ſide; the eyeballs and eyebrows riſe directly up; the mouth half opens, and the two corners are alſo a little turned up: the other parts remain in their natural ſtate.

6. The paſſion of *deſire* brings the eyebrows cloſe together and forwards toward the eyes, which are more open than ordinary: the eyeball is inflamed, and places itſelf in the middle of the eye; the noſtrils riſe up, and are contracted towards the eyes; the mouth half opens, and the ſpirits being in motion give a lively glowing colour.

7. Very little alteration is remarked in the face of thoſe that feel within themſelves the *ſweetneſs of joy*, or *joy with tranquillity.* The forehead is ſerene; the eyebrow without motion, elevated in the middle; the eye pretty open and with a laughing air; the eyeball lively and ſhining; the corners of the mouth turn up a little; the complexion is lively; the cheeks and lips are red.

8. *Laughter*, which is produced by joy mixed with ſurpriſe, makes the eyebrow riſe towards the middle of the eye, and bend towards the ſides of the noſe; the eyes are almoſt ſhut, and ſometimes appear wet, or ſhed tears, which make no alteration in the face; the mouth half open, ſhows the teeth; the corners of the mouth drawn back, cauſe a wrinkle in the cheeks, which appear ſo ſwelled as to hide the eyes in ſome meaſure; the noſtrils are open, and all the face is of a red colour.

9. *Acute pain* makes the eyebrows approach one another, and riſe towards the middle; the eyeball is hid under the eyebrows; the noſtrils riſe and make a wrinkle in the cheeks; the mouth half opens and draws back: all the parts of the face are agitated in proportion to the violence of the pain.

10. *Simple bodily pain* produces proportionally the ſame motions as the laſt, but not ſo ſtrong: The eyebrows do not approach and riſe ſo much; the eyeball appears fixed on ſome object; the noſtrils riſe, but the wrinkles in the cheeks are leſs perceivable; the lips are further aſunder towards the middle, and the mouth is half open.

11. The dejection that is produced by *ſadneſs* makes the eyebrows riſe towards the middle of the forehead more than towards the cheeks; the eyeball appears full of perturbation; the white of the eye is yellow; the eyelids are drawn down, and a little ſwelled; all about the eyes is livid; the noſtrils are drawn downward; the mouth is half open, and the corners are drawn down; the head careleſsly leaning on one of the ſhoulders: the face is of a lead colour; the lips pale.

12. The alterations that *weeping* occaſions are ſtrongly marked: The eyebrows ſink down towards the middle of the forehead; the eyes are almoſt cloſed, wet, and drawn down towards the cheeks; the noſtrils ſwelled; the muſcles and veins of the forehead appear; the mouth is ſhut, and the ſides of it are drawn down, making wrinkles on the cheeks; the under lip puſhed out, preſſes the upper one: all the face is wrinkled and contracted; its colour is red, eſpecially about the eyebrows, the eyes, the noſe, and the cheeks.

13. The lively attention to the misfortunes of another, which is called *compaſſion*, cauſes the eyebrows to ſink towards the middle of the forehead; the eyeball to be fixed upon the object; the ſides of the noſtrils next the noſe to be a little elevated, making wrinkles in the cheeks; the mouth to be open; the upper lip to be lifted up and thruſt forwards; the muſcles and all the parts of the face ſinking down and turning towards the object which excites the paſſion.

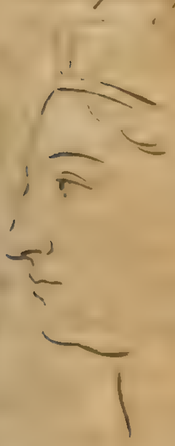
14. The motions of *ſcorn* are lively and ſtrong: The forehead is wrinkled; the eyebrow is knit; the ſide of it next the noſe ſinks down, and the other ſide riſes very much; the eye is very open, and the eyeball is in the middle; the noſtrils riſe, and draw towards the eyes, and make wrinkles in the cheeks; the mouth ſhuts, its ſides ſinking down, and the under-lip is puſhed out beyond the upper one.

15. An object deſpiſed ſometimes cauſes *horror*, and then the eyebrow knits, and ſinks a great deal more. The eyeball, placed at the bottom of the eye, is half covered by the lower eyelid; the mouth is half open, but cloſer in the middle than the ſides, which being drawn back,

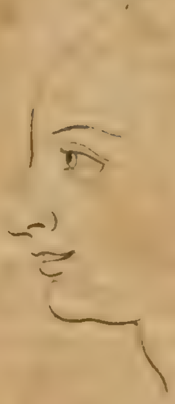
PASSIONS.

Plate CCCCV.

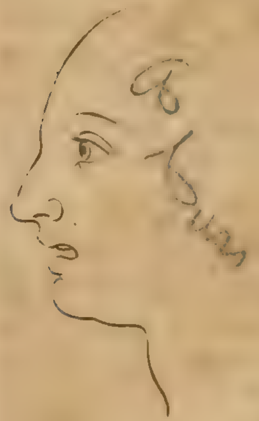
Tranquillity



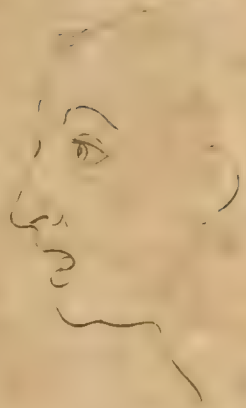
Joy



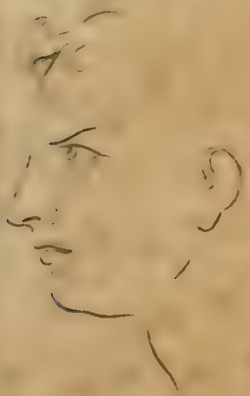
Admiration



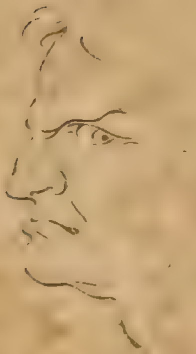
Astonishment



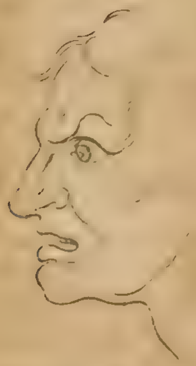
Attention & Esteem



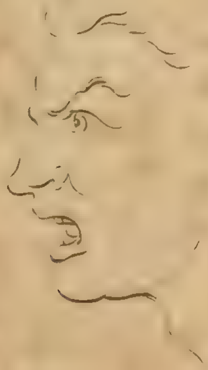
Scorn & Hatred



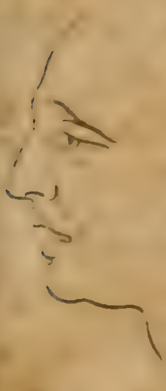
Horror



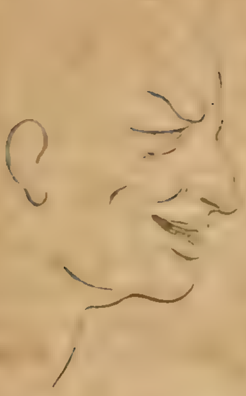
Fright



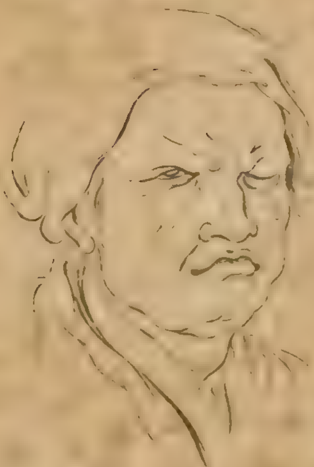
Sadneſs



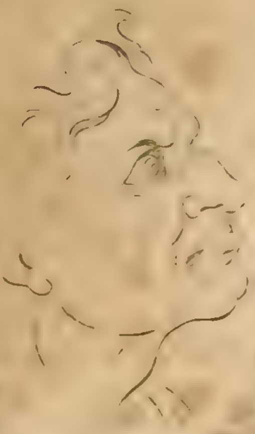
Laughter



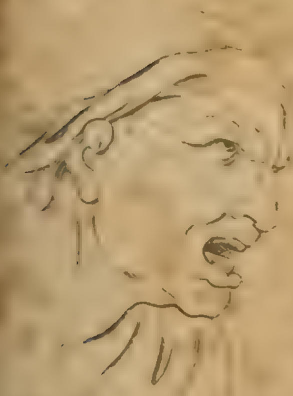
Weeping



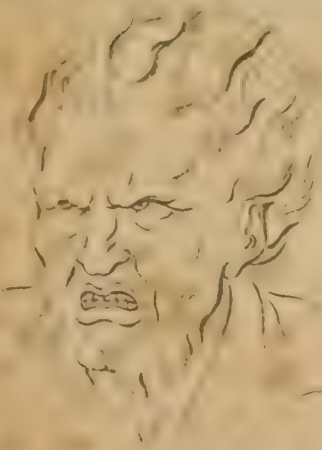
Anger



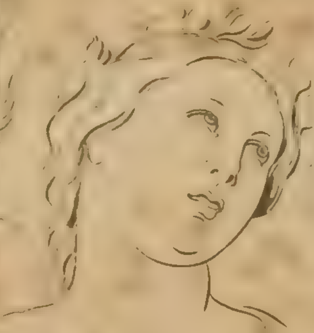
Anger mixed with fear



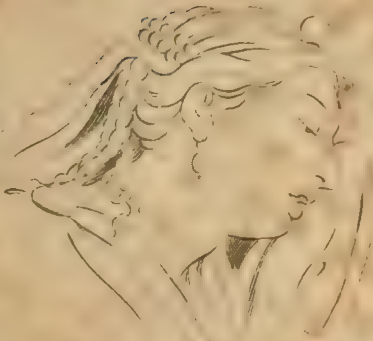
Extreme Despair



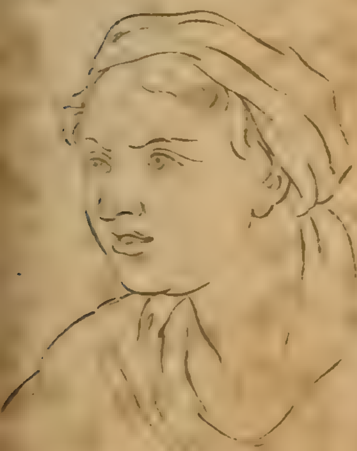
Love



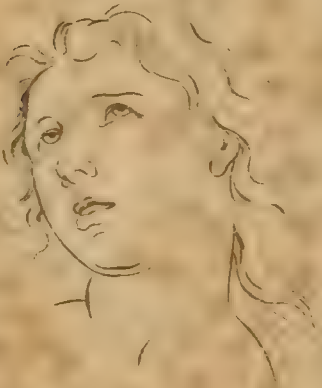
Humility



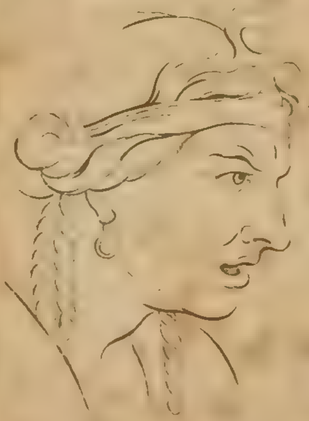
Desire



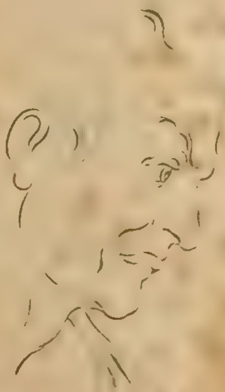
Rapture



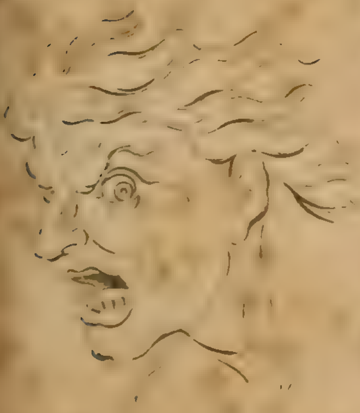
Fear



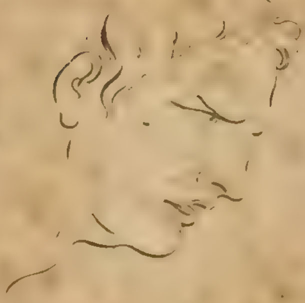
Disdain



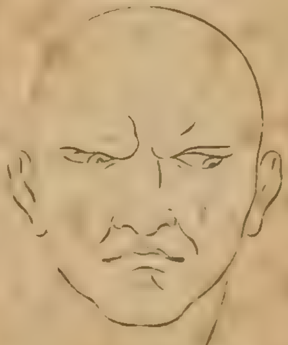
Terror



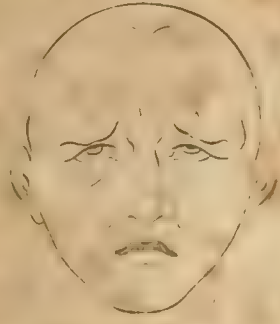
Compassion



Jealousy



Acute distress of body & mind



Bell [illegible]

Paſſion
||
Paſſive.

back, makes wrinkles in the cheeks; the face grows pale, and the eyes become livid; the muſcles and the veins are marked.

16. The violence of *terror or fright*, alters all the parts of the face; the eyebrow riſes in the middle; its muſcles are marked, ſwelled, preſſed one againſt the other, and ſunk towards the noſe, which draws up as well as the noſtrils; the eyes are very open; the upper eyelid is hid under the eyebrow; the white of the eye is encompaſſed with red; the eyeball fixes toward the lower part of the eye; the lower part of the eyelid ſwells and becomes livid; the muſcles of the noſe and cheeks ſwell, and theſe laſt terminate in a point toward the ſides of the noſtrils; the mouth is very open, and its corners very apparent; the muſcles and veins of the neck ſtretched; the hair ſtands on end; the colour of the face, that is, the end of the noſe, the lips, the ears, and round the eyes, is pale and livid; and all ought to be ſtrongly marked.

17. The effects of *anger* ſhow its nature. The eyes become red and inflamed; the eyeball is ſtaring and ſparkling; the eyebrows are ſometimes elevated and ſometimes ſunk down equally: the forehead is very much wrinkled, with wrinkles between the eyes; the noſtrils are open and enlarged: the lips preſſing againſt one another, the under one riſing over the upper one leaves the corners of the mouth a little open, making a cruel and diſdainful grin.

18. *Hatred or jealouſy* wrinkles the forehead; the eye brows are ſunk down and knit; the eyeball is half hid under the eyebrows, which turn towards the object; it ſhould appear full of fire, as well as the white of the eye and the eyelid; the noſtrils are pale, open, more marked than ordinary, and drawn backward ſo as to make wrinkles in the cheeks; the mouth is ſo ſhut as to ſhow the teeth are cloſed; the corners of the mouth are drawn back and very much ſunk; the muſcles of the jaw appear ſunk; the colour of the face is partly inflamed and partly yellowiſh; the lips pale or livid.

19. As *deſpair* is extreme, its motions are ſo likewiſe; the forehead wrinkles from the top to the bottom; the eyebrows bend down over the eyes, and preſs one another on the ſides of the noſe; the eye ſeems to be on fire, and full of blood; the eyeball is diſturbed, hid under the eyebrow, ſparkling and unfixed; the eyelid is ſwelled and livid; the noſtrils are large, open, and lifted up; the end of the noſe ſinks down; the muſcles, tendons, and veins, are ſwelled and ſtretched; the upper part of the cheeks is large, marked, and narrow towards the jaw; the mouth drawn backwards is more open at the ſides than in the middle; the lower lip is large and turned out; they gnaſh their teeth; they foam; they bite their lips, which are pale; as is the reſt of the face; the hair is ſtraight and ſtands on end.

Passion-Flower. See Passiflora, Botany *Index*.

Passion-Week, the week immediately preceding the feſtival of Eaſter; ſo called, becauſe in that week our Saviour's paſſion and death happened. The Thurſday of this week is called *Maunday Thurſday;* the Friday, *Good Friday;* and the Saturday, the *Great Sabbath.*

PASSIVE, in general, denotes ſomething that ſuffers the action of another, called an *agent* or *active power*. In grammar, the verb or word that expreſſes this paſſion is termed a *paſſive verb:* which, in the learned languages, has a peculiar termination; as *amor*, *doceor*, &c. in Latin; that is an *r* is added to the actives *amo*, *doceo:* and, in the Greek, the inflection is made by changing ω into ομαι; as τυπτω, τυπτομαι, &c. But in the modern languages, the paſſive inflection is performed by means of auxiliary verbs, joined to the participle of the paſt tenſe; as, "I am praiſed," in Latin *laudor*, and in Greek επαινεομαι; or, "I am loved," in Latin *amor*, and in Greek φιλεομαι. Thus it appears that the auxiliary verb *am*, ſerves to form the paſſives of Engliſh verbs: and the ſame holds of the French; as, *Je ſuis loué*, "I am praiſed;" *j'ai eté loué*, "I have been praiſed," &c. See Grammar.

Paſſive
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Paſſive
Obedience.

Passive Title, in *Scots Law*. See Law, Part III. N° clxxx. 30.

Passive Obedience, a political doctrine which has been much miſrepreſented, and is, of courſe, very obnoxious to the friends of freedom. Some nonjurors, in the end of the laſt and in the beginning of the paſſing century, imagining that monarchy is the only lawful form of government, and that hereditary monarchy is the only lawful ſpecies of that government, have coupled with paſſive obedience the ridiculous notion of a divine, hereditary, indefeaſible right of certain families to govern with deſpotic ſway all other families of the ſame nation. The abſurdity of this notion needs not to be dwelt upon; but it may not be improper, to obſerve, that it has nothing to do with paſſive obedience.

As taught by the ableſt reaſoners, who think that they are ſupported by the holy ſcripture, paſſive obedience is as much a duty under republican as under monarchical governments; and it means no more, but that private individuals are bound by the moſt ſolemn moral ties not to reſiſt the ſupreme power whereſoever placed in any nation. The ſupreme power can only be the legiſlature; and no man or body of men, who have not the power of enacting and abrogating laws can, on this principle, claim paſſive obedience from any ſubject. Whether the principle be well or ill founded, the abſurdity which commonly attaches to the phraſe *paſſive obedience*, originates from the miſtaken loyalty of the adherents of the houſe of Stuart, who to aggravate the illegality of the revolution, were wont to repreſent James II. as ſupreme over both houſes of parliament, and of courſe over all law. That ſuch reveries were fooliſh, we need no farther evidence than the ſtatute-book, which ſhows, that in the office of legiſlation, the king, lords, and commons, are co-ordinate; and that when any one of theſe powers ſhall take upon itſelf to counteract the other two, the duty of paſſive obedience will oblige the ſubject to ſupport the legiſlature. That reſiſtance to the legiſlature, if lawful on any occaſion, can be ſo only to oppoſe the moſt violent tyranny, has been ſhown by Mr Hume with great cogency of argument, and is indeed a propoſition ſelf-evident. That it can never be lawful on any occaſion, Biſhop Berkeley endeavoured to prove by a chain of reaſoning which it would be difficult to break. We enter not into the controverſy, but refer our readers to Hume's Eſſays and Berkeley's Paſſive Obedience and Nonreſiſtance, or, as it was intitled by a late editor, The Meaſure of Submiſſion to Civil Government. We ſhall only obſerve, that there is a great difference between *active* and *paſſive* obedience: and that many who conſider themſelves as bound on *no account whatever* to *reſiſt* the ſupreme power, would yet ſuffer death rather than do an immoral action in obedience to any law of earthly origin.

PASSIVE Prayer, among the *myſtic divines*, is a total ſuſpenſion or ceſſation of the intellectual faculties; in virtue whereof, the ſoul remains of itſelf, and as to its own power, impotent with regard to the producing of any effects. The paſſive ſtate, according to Fenelon, is only paſſive in the ſame ſenſe as contemplation is, *i. e.* it does not exclude peaceable, diſintereſted acts, but only unquiet ones, or ſuch as tend to our own intereſt. In the paſſive ſtate, the ſoul has not properly any activity, and ſenſation, of its own: it is a mere infinite flexibility of the ſoul, to which the feebleſt impulſe of grace gives motion.

PASSOVER, a ſolemn feſtival of the Jews, inſtituted in commemoration of their coming out of Egypt; becauſe the night before their departure, the deſtroying angel, who put to death the firſt born of the Egyptians, paſſed over the houſes of the Hebrews without entering therein, becauſe they were marked with the blood of the lamb which was killed the evening before, and which for this reaſon was called the *paſchal lamb*. This feaſt was called *paſcha* by the old Greeks and Romans; not we preſume from πασχω "I ſuffer," as Chryſoſtom, Irenæus, and Tertullian, ſuppoſe, but from the Hebrew word *peſah, paſſage, leap*. The following is what God ordained concerning the paſſover of the Jews, (Exod. xii.). The month of the coming forth from Egypt was looked upon from this time to be the firſt month of the ſacred or eccleſiaſtical year, and the fourteenth day of this month, between the two veſpers, that is, between the ſun's decline and his ſetting; or rather, according to our manner of reckoning, between two o'clock in the afternoon and ſix o'clock in the evening at the equinox, they were to kill the paſchal lamb, and to abſtain from leavened bread. The day following being the fifteenth, counting from ſix o'clock of the foregoing evening, which concluded the fourteenth, was the grand feaſt of the paſſover, which continued ſeven days. But it was only the firſt and the ſeventh day that were ſolemn. The lamb that was killed ought to be without any defect, a male, and yeaned that year. If no lamb could be found, they might take a kid. They killed a lamb or a kid in every family; and if the number of thoſe that lived in the houſe was not ſufficient to eat a lamb, they might join two houſes together. With the blood of the paſchal lamb they ſprinkled the door-poſts and lintel of every houſe, that the deſtroying angel, at the ſight of the blood, might paſs over them, and ſave the Hebrew children. They were to eat the lamb the ſame night that followed the ſacrifice; they ate it roaſted, with unleavened bread, and a ſalad of wild lettuce. The Hebrew ſays literally, with bitter things, as ſuppoſe muſtard, or any thing of this nature to give a reliſh. It was forbid to eat any part of it raw, or boiled in water, nor were they to break a bone, (Exod. vii. 46. Numb. ix. 12. John xix. 36.); and if any thing remained to the day following, it was thrown into the fire. They that ate it were to be in the poſture of travellers, having their reins girt, their ſhoes on their feet, their ſtaves in their hands, and eating in a hurry. But this laſt part of the ceremony was but little obſerved, at leaſt it was of no obligation. But only upon that night they came forth out of Egypt. For the whole eight days of the paſſover no leavened bread was to be uſed; and whoever ſhould eat any, was threatened to be cut off from his people. With regard to the ceremonies which are obſerved in relation to the bread, ſee the article BREAD.

They keep the firſt and laſt day of the feaſt, yet ſo as that it was allowed to dreſs victuals, which was forbidden on the Sabbath-day. The obligation of keeping the paſſover was ſo ſtrict, that whoever ſhould neglect to do it, was condemned to death, (Numb. ix. 13.). But thoſe who had any lawful impediment, as a journey, ſickneſs, or any uncleanneſs, voluntary or involuntary; for example, thoſe that had been preſent at a funeral, or by any other accident had been defiled, were to defer the celebration of the paſſover till the ſecond month of the eccleſiaſtical year, or to the fourteenth day of the month Jair, which anſwers to April and May. It was thus the Lord ordered Moſes, upon the occaſion of the inquiry of ſome Iſraelites, who had been obliged to pay their laſt offices to ſome of their relations, and who being thus polluted, were not capable of partaking of the paſchal ſacrifice, (2 Chr. xxx. 1, 2, &c.) The modern Jews obſerve in general the ſame ceremonies that were practiſed by their anceſtors, in the celebration of the paſſover. On the fourteenth of Niſan, the firſt-born faſt in memory of God's ſmiting the firſt-born of the Egyptians. The morning prayers are the ſame with thoſe ſaid on other feſtivals. They take the roll of the pentateuch out of the cheſt, and read as far as the end of the twelfth chapter of Exodus, and what is contained in the eighteenth chapter of Numbers, relating to the paſſover. The matron of the family then ſpreads a table, and ſets on it two unleavened cakes, and two pieces of the lamb, a ſhoulder boiled and another roaſted, to put them in mind that God delivered them with a ſtretched-out arm. To this they add ſome ſmall fiſhes, becauſe of the leviathan; a hard egg, becauſe of the ziz; ſome meal, becauſe of the behemoth, (theſe three animals being appointed for the feaſt of the elect in the other life); and peas and nuts for the children, to provoke their curioſity to aſk the reaſon of this ceremony. They likewiſe uſe a kind of muſtard, which has the appearance of mortar, to repreſent their making bricks in Egypt. The father of the family ſits down with his children and ſlaves, becauſe on this day all are free. Being ſet down, he takes bitter herbs, and dips them in the muſtard, then eats them, and diſtributes to the reſt. Then they eat of the lamb, the hiſtory and inſtitution of which is at that time recited by the maſter of the family. The whole repaſt is attended with hymns and prayers. They pray for the prince under whoſe dominion they live, according to the advice of Jeremiah (xxix. 7.), "Seek the peace of the city whither I have cauſed you to be carried away captives, and pray unto the Lord for it: for in the peace thereof ſhall ye have peace." See the article FEAST, &c. The ſame things are put in practice the two following days; and the feſtival is concluded by the ceremony *habdala* or diſtinction. This ceremony is performed at the cloſing of the Sabbath-day, at which time the maſter of the houſe pronounces certain benedictions, accompanied with certain formalities, requeſting that every thing may ſucceed well the week following. After going out of the ſynagogue, they

aſover,
aſport.

they then eat leavened bread for the laſt time. (Leo of Modena, p. iii. c. 3. and the Rabbins.) While the temple was ſtanding, they brought their lambs thither, and ſacrificed them, offering the blood to the prieſt, who poured it out at the foot of the altar. The paſſover was typically predictive of Chriſt our chriſtian paſſover, (1 Cor. v. 7.). As the deſtroying angel paſſed over the houſes marked with the blood of the paſchal lamb, ſo the wrath of God paſſes over them whoſe ſouls are ſprinkled with the blood of Chriſt. The paſchal lamb was killed before Iſrael was delivered, ſo it is neceſſary Chriſt ſhould ſuffer before we could be redeemed. It was killed before Moſes's law or Aaron's ſacrifices were enjoined, to ſhow that deliverance comes to mankind by none of them; but only the true paſſover, that Lamb of God ſlain from the foundation of the world, (Rom. iii. 25. Heb. ix. 14.). It was killed the firſt month of the year, which prefigured that Chriſt ſhould ſuffer death in this month, (John xviii. 28.). It was killed in the evening, (Exod. xii. 6.). So Chriſt ſuffered in the laſt days, and at this time of the day, (Matt. xxvii. 46. Heb. i. 2.). At even alſo the ſun ſets, which ſhows that it was the Sun of Righteouſneſs who was to ſuffer and die, and that at his paſſion univerſal darkneſs ſhould be upon the whole earth, Luke xxiii. 44.). The paſſover was roaſted with fire, to denote the ſharp and dreadful pains which Chriſt ſhould ſuffer, not only from men, but from God alſo. It was to be eaten with bitter herbs, not only to put them in remembrance of their bitter bondage in Egypt but alſo to typify our mortification to ſin, and readineſs to undergo afflictions for Chriſt, (Col. i. 24.). Many erroneouſly imagine, that the paſſover was inſtituted in memory of the Iſraelites paſſing the Red Sea; though it is certain the feaſt was held, and had its name, before the Iſraelites took a ſtep of their way out of Egypt, and conſequently ſeveral days before their paſſing the Red Sea. Beſides the paſſover celebrated on the fourteenth of the firſt month, there was a ſecond paſſover held on the fourteenth of the ſecond month after the equinox, inſtituted by God in favour of travellers and ſick perſons, who could not attend at the firſt, nor be at Jeruſalem on the day. The Greeks, and even ſome of the catholic doctors, from the thirteenth, eighteenth, and nineteenth, chapters, of St John, take occaſion to conclude, that Jeſus anticipated the day marked for the paſsover in the law; but the authority of three evangeliſts ſeems to evince the contrary. See Whitby's Diſſertation on this ſubject, in an appendix to the fourteenth chapter of St Mark. F. Lamy ſuppoſes, that our Lord did not attend at the paſſover the laſt year of his life; which ſentiment has drawn upon him abundance of oppoſers. F. Hardouin aſſerts, that the Galileans celebrated the paſſover on one day, and the Jews on another.

PASSPORT, or **Pass**, a licence or writing obtained from a prince or governor, granting permiſſion and a ſafe conduct to paſs through his territories without moleſtation: Alſo a permiſſion granted by any ſtate to navigate in ſome particular ſea, without hinderance or moleſtation from it. It contains the name of the veſſel, and that of the maſter, together with her tonnage and the number of her crew, certifying that ſhe belongs to the ſubjects of a particular ſtate, and requiring all perſons at peace with that ſtate to ſuffer her to proceed on her voyage without interruption.

Paſſport
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Paſte.

The violation of ſafe conducts or paſſports expreſsly granted by the king or by his ambaſſadors to the ſubjects of a foreign power in time of mutual war, or committing acts of hoſtility againſt ſuch as are in amity, league, or truce with us, who are here under a general implied ſafe-conduct, are breaches of the public faith, without which there can be no intercourſe or commerce between one nation and another; and ſuch offences may, according to the writers upon the law of nations, be a proper ground of a national war. And it is enacted by the ſtatute 31 Hen. VI. cap. 4. ſtill in force, that if any of the king's ſubjects attempt or offend upon the ſea, or in any port within the king's obeyſance, or againſt any ſtranger in amity, league, or truce, or under ſafe-conduct, and eſpecially by attacking his perſon, or ſpoiling him, or robbing him of his goods; the lord-chancellor, with any of the juſtices of either the king's-bench or common-pleas, may cauſe full reſtitution and amends to be made to the party injured. Paſquier ſays. that *paſſport* was introduced for *paſſe par tout*. Balzac mentions a very honourable paſſport given by an emperor to a philoſopher in theſe terms: "If there be any one on land or ſea hardy enough to moleſt Potamon, let him conſider whether he be ſtrong enough to wage war with Cæſar."

Passport is uſed likewiſe for a licence granted by a prince for the importing or exporting merchandizes, moveables, &c. without paying the duties. Merchants procure ſuch paſſports for certain kinds of commodities: and they are always given to ambaſſadors and miniſters for their baggage, equipage, &c.

Passport is alſo a licence obtained for the importing or exporting of merchandizes deemed contraband, and declared ſuch by tariffs, &c. as gold, ſilver, precious ſtones, ammunition of war, horſes, corn, wool, &c. upon paying duties.

PASSUS, among the Romans, a meaſure of length, being about four feet ten inches, or the thouſandth part of a Roman mile. The word properly ſignifies, the ſpace betwixt the feet of a man walking at an ordinary rate. See Measure.

PASTE, in *Cookery*, a ſoft compoſition of flour, wrought up with proper fluids, as water, milk, or the like, to ſerve for caſes or coffins, therein to bake meats, fruits, &c. It is the baſis or foundation of pyes, tarts, patties, paſties, and other works of paſtry. It is alſo uſed in confectionary, &c. for a preparation of ſome fruit, made by beating the pulp thereof with ſome fluid or other admixture, into a ſoft pappy conſiſtence, ſpreading it into a diſh, and drying it with ſugar, till it becomes as pliable as an ordinary paſte. It is uſed occaſionally alſo for making the cruſts and bottoms of pyes, &c. Thus, with proper admixtures, are made almond paſtes, apple paſtes, apricot paſtes, cherry, currant, lemon, plum, peach, and pear paſtes.

Paste is likewiſe uſed for a preparation of wheaten flour, boiled up and incorporated with water; uſed by various artificers, as upholſterers, ſaddlers, bookbinders, &c. inſtead of glue or ſize, to faſten or cement their cloths, leathers, papers, &c. When paſte is uſed by bookbinders, or for paper-hangings to rooms, they mix a fourth, fifth, or ſixth, of the weight of the flour of powdered reſin; and where it is wanted ſtill more tenacious, gum arabic or any kind of ſize may be added. Paſte may be preſerved, by diſſolving a little ſublimate, in the proportion of a dram to a quart, in the water employed for making it, which will prevent not only rats and mice, but any other kind of vermin and inſects, from preying upon it.

PASTES, in the glaſs trade, or the imitation or counterfeiting of gems in glaſs: ſee GEM.

PASTEBOARD, a kind of thick paper, formed of ſeveral ſingle ſheets paſted one upon another. The chief uſe of paſteboard is for binding books, making letter-caſes, &c. See PAPER.

PASTERN *of a* HORSE, in the manege, is the diſtance betwixt the joint next the foot and the coronet of the hoof. This part ſhould be ſhort, eſpecially in middle-ſized horſes; becauſe long paſterns are weak, and cannot ſo well endure travelling.

PASTERN Joint, the joint next a horſe's foot.

PASTIL, or PASTEL, among painters, a kind of paſte made of different colours ground up with gum-water, in order to make CRAYONS.

PASTIL, in *Pharmacy*, is a dry compoſition of ſweet-ſmelling reſins, aromatic woods, &c. ſometimes burnt to clear and ſcent the air of a chamber.

PASTIME, a ſport, amuſement, or diverſion. Paſtimes of ſome kind ſeem to be abſolutely neceſſary, and to none more than to the man of ſtudy; for the moſt vigorous mind cannot bear to be always bent. Conſtant application to one purſuit, if it deeply engage the attention, is apt to unhinge the mind, and to generate madneſs; of which the Don Quixote of Cervantes, and the aſtronomer of Johnſon, are two admirably conceived inſtances. But though paſtime is neceſſary to relieve the mind, it indicates great frivolity when made the buſineſs of life; and yet the rich and the great, who are not obliged to labour for the means of ſubſiſtence, too often rove from paſtime to paſtime with as conſtant aſſiduity as the mechanic toils for his family, or as the philoſopher devotes himſelf to the cultivation of ſcience. When thoſe paſtimes tend to give elaſticity to the mind or ſtrength to the body, ſuch conduct is not only allowable, but praiſe-worthy; but when they produce effects the reverſe of theſe, it is both hurtful and criminal. The gaming-table, the maſquerade, the midnight aſſembly of any ſort, muſt of neceſſity enfeeble both the body and the mind; and yet ſuch are the faſhionable amuſements of the preſent day, to which many a belle and many a beau ſacrifice their beauty, their health, their quiet, and their virtue.

Far different were the paſtimes of our wiſer anceſtors: Remote from vice and effeminacy, they were innocent, manly, and generous exerciſes. From the ancient records of this country, it appears, that the ſports, amuſements, pleaſures, and recreations, of our anceſtors, as deſcribed by Fitz-Stephen (A), added ſtrength and agility to the wheels of ſtate mechaniſm, while they had a direct tendency towards utility. For moſt of theſe ancient recreations are reſolvable into the public defence of the ſtate againſt the attacks of a foreign enemy. The play at ball, derived from the Romans, is firſt introduced by this author as the common exerciſe of every ſchool-boy. The performance was in a field, where the reſort of the moſt ſubſtantial and conſiderable citizens, to give encouragement and countenance to this feat of agility, was ſplendid and numerous. The intention of this amuſement at this period of time was to make the juvenile race active, nimble, and vigorous; which qualities were requiſite whenever their aſſiſtance ſhould be wanted in the protection of their country. The next ſpecies of paſtime indeed does not ſeem to have this tendency; but it was only, as it ſeems, an annual cuſtom: This was cock-fighting. The author tells us, that in the afternoon of Shrove-Tueſday, on which day this cuſtom prevailed, they concluded the day in throwing the ball: which ſeems to inſinuate, that the cock-fighting was merely in conformity to ancient uſage, and limited only to part of the day, to make way for a more laudable performance. We may reaſonably ſuppoſe, although this author is entirely ſilent upon this head, that while cock-fighting was going on, cock-throwing was the ſport of the loweſt claſs of people, who could not afford the expence of the former (B). Another ſpecies of manly exerciſe was truly martial, and intended to qualify the adventurers for martial diſcipline. It is related by Fitz-Stephen thus: "Every Friday in Lent, a company of young men comes into the field on horſeback, attended and conducted by the beſt horſemen: then march forth the ſons of the citizens, and other young men, with diſarmed lances and ſhields; and there practiſe feats of war. Many courtiers likewiſe, when the king is near the ſpot, and attendants upon noblemen, do repair to theſe exerciſes; and while the hope of victory does inflame their minds, they ſhow by good proof how ſerviceable they would be in martial affairs." This evidently is of Roman deſcent, and immediately brings to our recollection the *Ludus Trojæ*, ſuppoſed to be the invention, as it was the common exerciſe of, Aſcanius. The common people, in this age of maſculine manners, made every amuſement where ſtrength was exerted the ſubject-matter of inſtruction and improvement: inſtructed

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(A) Otherwiſe called William Stephanides, a monk of Canterbury, who lived in the reign of King Stephen to the time of Richard I. He wrote a Latin treatiſe, in which he gives an account of the ſeveral paſtimes which were countenanced in his time. Bale in his writings draws a pleaſing portrait of him. He is likewiſe ſketched in ſtrong and forcible outlines of praiſe and commendation by Leland. Bale ſays thus of him: "The time which other people uſually miſemployed in an idle and frivolous manner, he conſecrated to inquiries which tended to increaſe the fame and dignity of his country: in doing which, he was not unworthy of being compared to Plato; for like him, he made the ſtudy of men and heaven his conſtant exerciſe."

(B) There were places ſet apart for the battles of theſe animals, as at this day, where no one was admitted without money. Theſe places, or *pits* commonly called, were ſchools, as at this day, in which people were inſtructed in the doctrines of chance, loſs and gain, betting and wagers, and particularly in the liberal art of *laying two to one*. Cock-throwing has been laudably aboliſhed; for it was a ſpecies of cruelty towards an innocent and uſeful animal; and ſuch a cruelty as would have kindled compaſſion in the heart of the rankeſt barbarian.

Pastime.

inſtructed to exert their bodily ſtrength in the maintenance of their country's rights; and their minds improved by ſuch exertion, into every manly and generous principle.

In the vacant intervals of induſtry and labour, commonly called the holy-days, indolence and inactivity, which at this day mark this portion of time, were found only in thoſe whoſe lives were diſtempered with age or infirmity. The view which Fitz Stephen gives us of the Eaſter holydays is animated. "In Eaſter holydays they fight battles upon the water. A ſhield is hanged upon a pole, fixed in the middle of the ſtream. A boat is prepared without oars, to be borne along by the violence of the water; and in the forepart thereof ſtandeth a young man, ready to give charge upon the ſhield with his lance. If ſo be that he break his lance againſt the ſhield, and doth not fall, he is thought to have performed a worthy deed. If without breaking his lance he runs ſtrongly againſt the ſhield, down he falleth into the water; for the boat is violently forced with the tide: but on each ſide of the ſhield ride two boats, furniſhed with young men, who recover him who falleth ſoon as they may. In the holydays all the ſummer the youths are exerciſed in leaping, dancing, ſhooting, wreſtling, caſting the ſtone, and practiſing their ſhields; and the maidens trip with their timbrels, and dance as long as they can well ſee. In winter, every holyday before dinner, the boars prepared for brawn are ſet to fight, or elſe bulls or bears are baited."

Theſe were the laudable purſuits to which leiſure was devoted by our forefathers, ſo far back as the year 1130. Their immediate ſucceſſors breathed the ſame generous ſpirit. In the year 1222, the ſixth year of Henry III. we find, that certain maſters in exerciſes of this kind made a public profeſſion of their inſtructions and diſcipline, which they imparted to thoſe who were deſirous of attaining excellence and victory in theſe honourable atchievements. About this period, the perſons of better rank and family introduced the play of *Tennis* (c); and erected courts or oblong edifices for the performance of the exerciſe.

About the year 1253, in the 38th year of Henry III. the *Quintan* was a ſport much in faſhion in almoſt every part of the kingdom. This contrivance conſiſted of an upright poſt firmly fixed in the ground, upon the top of which was a croſs piece of wood, moveable upon a ſpindle; one end of which was broad like the flat part of a halberd, while at the other end was hung a bag of ſand. The exerciſe was performed on horſeback. The maſterly performance was, when, upon the broad part being ſtruck with a lance, which ſometimes broke it, the aſſailant rode ſwiftly on, ſo as to avoid being ſtruck on the back by the bag of ſand, which turned round inſtantly upon the ſtroke given with a very ſwift motion. He who executed this feat in the moſt dexterous manner was declared victor, and the prize to which he became intitled was a peacock. But if, upon the aim taken, the contender miſcarried in ſtriking at the broadſide, his impotency of ſkill became the ridicule and contempt of the ſpectators.

Dr Plott, in his Natural Hiſtory of Oxfordſhire, tells us, that this paſtime was in practice in his time at Deddington in this county. "They firſt (ſays this author) fixed a poſt perpendicularly in the ground, and then placed a ſmall piece of timber upon the top of it, faſtened on a ſpindle, with a board nailed to it on one end, and a bag of ſand hanging at the other. Againſt this board they anciently rode with ſpears: now as I ſaw it at Deddington only with ſtrong ſtaves, which violently bringing about the bag of ſand, if they make not good ſpeed away, it ſtrikes them in the neck or ſhoulders, and ſometimes perhaps ſtrikes them down from their horſes; the great deſign of the ſport being to try the agility both of man and horſe, and to break the board; which, whoever did, was accounted conqueror: for whom heretofore there was ſome reward always appointed." (D)

Matthew Paris, ſpeaking of this manly diverſion, ſays, "The London youths made trial of their ſtrength on horſeback, by running at the *Quintan*; in doing which, whoever excelled all the reſt was rewarded with a peacock." This ſport is continued to this day in Wales; and being in uſe only upon marriages, it may be conſidered as a votive paſtime, by which theſe heroic ſpirits ſeem to wiſh, that the male iſſue of ſuch marriage may be as ſtrong, vigorous, and active, as thoſe who are at that time engaged in the celebration of this feſtive exertion of manhood. Virtuous exerciſes of this kind would

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(c) The word *Tennis* ſeems to owe its original to the French language: if ſo, the game is of French production. Yet the word *tenez* will hardly be found to afford incontrovertible evidence upon this ſubject. For the holding or keeping poſſeſſion of the ball is no part of the game, but rather a circumſtance caſually attending it. ſince, during the performance of it the ball is in continual motion, ſo there can be no *tenez* at this juncture. Perhaps a place in France called *Tennois* (as there is a town which differs only in a letter, called *Sennois*, in the diſtrict of Champagne) was the place where the balls were firſt made, and the game firſt introduced.

(D) This was certainly an exerciſe derived from a military inſtitution of the Romans, though not inſtrumentally the ſame. Whoever conſiders the form and diſpoſition of the Roman camps, which were formed into a ſquare figure, will find there were four principal gates or paſſages. Near the *Quæſtorium*, or Quæſtor's apartment, was the *Forum*, or what is now called a ſuttling houſe, and from being near the Quæſtor's ſtation called *Quæſtorium forum*. At this part was a fifth gate *Quintana*, where the ſoldiers were inſtructed in the diſcipline of the *Palaria*, which was to aim at and ſtrike their javelins againſt an upright poſt fixed in the ground, as a kind of *proluſion* to a real engagement with ae enemy. By the frequent practice of this exerciſe, ſometimes called *exercitium ad palum* by Roman writers, the ſoldiers at length acquired not only a dexterity and addreſs in the management of their arms, but a conſtant and regular exactneſs in the direction of them. *Titus Livius Patavinus*, cap. 2. *Pancirollus Rerum Memoral.* lib. ii. tit. 21. *Vulturius in Auguſtanis Monumentis.* lib. li. p. 237.

Upon the irruption of the *Istri* into the Roman camps, which they plundered, ſays Livius, *ad Quæſtorium forum, quintanamque pervenerunt.*

Paſtime. would be too rude and barbarous for the attendants on pleaſure in the preſent age. The hand would tremble at the weight of the javelin; and the heart would pant upon the apprehenſion of perſonal inſecurity. While theſe exertions of triumphant proweſs continued, the ſordid degeneracy of diſpoſition, the ſupple lateneſs of temper, were unknown: for the love of country, as the Roman orator has wiſely obſerved, *included all other virtues*. But if we guard the palace of honour, like the brazen caſtle of Danaë, with every poſſible ſecurity, importunate corruption will be ever waiting at the gate, to ſeize an opportunity of intruſion. Theſe feats of honourable conteſt were ſucceeded by the gilded banners of exhibition, and all the long train of dependents in the intereſt of indolence: for the writers of theſe times inform us, that the ſoft pleaſures of the ſtage forced the paſſes to public favour in the year 1391, and likewiſe in the year 1409; ſo that utility, which before ſtood on the right hand of pleaſure, was now ordered to withdraw for a ſeaſon. The drama, it ſeems, was attempted by a ſet of uſeleſs and inſignificant perſons called *pariſh-clerks*; who, becauſe they had the knowledge of the alphabet, ignorantly preſumed that this included every other ſpecies of knowledge. The ſubject was truly ſerious, the creation of the world; but the performance muſt have been ludicrous. It was, however, honoured with the attendance of noble perſonages; and royalty itſelf deigned to caſt a favourable eye upon it, for the king and queen were preſent. Theſe interludes laſted no longer than the time requiſite for the former confederacy of utility and pleaſure to reſume its powers; as when the pliable bow by being too much bent is put out of ſhape, and by its elaſticity recovers its former poſition. The lance, the ſhield, the ball, and the equeſtrian proceſſion, came forward again, and put the dramatic uſurper to flight. After this period, theſe objects of generous pleaſure ſeem to have had their audience of leave, and one general object, indeed no leſs manly than the former, to have filled their ſtations, which was archery. This had a continuance to the reign of Charles I. for we find in many hoſpitals founded in that reign among the articles of benefaction recorded upon their walls, this ſingular proviſion, *arms for the boys*, which ſignified *bows and arrows*.

There are many places at this day, formerly reſorted to, for the practice of this noble art, diſtinguiſhed by appellations which indicate their ancient uſage: ſuch as Brentford Butts, Newington Butts, and many others of the like denomination. It appears from 33 Hen. VIII. that by the intruſion of other pernicious games, archery had been for a long time diſuſed; to revive which this ſtatute was made. It ſeems that the bows of the beſt kind were made of yew; and that this wood might be readily obtained for this purpoſe, yew-trees were planted in church yards. The ſons of thoſe only who were perſons of fortune and faſhion, if under 17 years of age, were permitted to uſe ſuch bows. The words of the ſtatute are ſingular, and ran thus: "No perſon under ſeventeen years, except he, or his father or mother, have lands or tenements to the yearly value of ten pounds, or be worth in value or moveables the ſum of forty marks ſterling, ſhall ſhoot with any bow of yew, which ſhall be bought for him, after the feaſt of our Lady next coming, under the pain to loſe and forfeit ſix ſhillings and eightpence." Two obſervations ariſe here upon theſe words. One, that the yew-wood, not being ſo common as other wood, might probably be ſoon found deficient, as it was the beſt wood for making bows, if not reſtrained in the uſe of it to particular ages and perſons, as young people wantonly deſtroy what is put into their hands for uſeful purpoſes. The other obſervation is, that the age of 17 is by this ſtatute diſtinguiſhed as the age of diſcretion, when young people are more attentive and conſiderate in things of private concern; an age in theſe times which few ever arrive at, and ſome never. This ſtatute makes proviſion of other kinds of wood for the common people in the following manner: "To the intent that every perſon may have bows of mean price, be it enacted, that every bowyer ſhall, for every bow that he maketh of yew, make four other bows, meet to ſhoot with, of elm, witch haſill, aſh, or other wood apt for the ſame, under pain to loſe and forfeit for every ſuch bow ſo lacking the ſum of three ſhillings and fourpence." It ſeems there was a ſpecies of yew at this time called *elk*, which wood was ſtronger and more pliant than the common yew mentioned in this ſtatute, and the price of it fixed. "Moreover, no bowyer ſhall ſell or put to ſale to any of the king's ſubjects, any bow of yew of the tax called *elk*, above the price of three ſhillings and fourpence, under the pain to forfeit twenty ſhillings for every bow ſold above the ſaid price."

From theſe ſeveral conſiderations which occur in this ſtatute, we can trace three reſplendent qualities, courage, ſtrength, and agility; which three united, inſpired to more, generoſity and magnanimity. Upon the decline of this and other poliſhed (E) amuſements, a ſavage deformity of manners ſprung up, but ſpangled here and there with the oppoſite character of lazy opulence, which began now to erect her velvet ſtandard in defiance of chaſte and regular manners.

Towards the beginning of James I.'s reign, military proweſs ſeems to have founded a retreat (F). He, to gratify the importunity of the common people, and at the

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(E) How widely different the conceptions of politeneſs at this day from what they were in the moſt refined ages of Greece and Rome! Theſe two ſtates agreed in fixing the ſtandard of this accompliſhment upon the fitneſs and propriety of things. We bend to an arbitrary impoſture of language, truſting to the ſenſe and meaning of our oppoſite Gallic neighbours, as if this iſland was at all times to be the foot-ball of that continent. To define politeneſs in its ancient and true ſenſe, it is a manly exertion of conduct, founded upon every noble and virtuous principle. Gallic politeneſs is an effeminate impotence of demeanor, founded upon fallacy, evaſion, and every inſidious artifice. There can be no ſecurity, no happineſs, no proſperity, awaiting this kingdom, ſo long as we fawn to faſhions that diſgrace humanity, and to manners which conſiſt of more than Punic perfidy.

(F) It has been confidently aſſerted by ſome hiſtorians, that James was, during his whole life, ſtruck with terror upon the ſight of a drawn ſword; which was the reaſon of his great unwillingneſs in beſtowing the honour of knighthood.

the ſame time to obviate his own ſuſpicions of a refuſal, publiſhed the book of ſports, in which the people had been ſome time before uſually indulged on Sunday evenings, but which had been lately prohibited. Theſe ſports conſiſted of dancing, ſinging, wreſtling, church ales, and other profanations of that day.

Charles, his ſucceſſor, wiſely, in the very entrance of his reign, aboliſhed theſe ſports. The act of Charles ſtates the ſeveral amuſements in part; by which we may conjecture what was the remainder as ſtated in the book of ſports by James. It is neceſſary to tranſcribe that part of the act relating to this ſubject. "Foraſmuch as there is nothing more acceptable to God, than the true and ſincere worſhip of Him, and ſervice according to His holy will, and that the holy keeping of the Lord's day is a principal part of the ſervice of God, which in many places of this realm hath been, and now is, prophaned and neglected by a diſorderly ſort of people, in exerciſing and frequenting bear-baiting, bull-baiting, interludes, and common plays, and other unlawful exerciſes and paſtimes, neglecting divine ſervice both in their own pariſhes and elſewhere: Be it enacted, that from and after forty days next after the end of this ſeſſion of parliament, there ſhall be no meetings, aſſemblies, or concourſe of people, out of their own pariſhes, on the Lord's day, within this realm of England, or any the dominions thereof, for any ſports or paſtimes whatſoever: nor any bear-baiting, bull-baiting, interludes, common plays, or other unlawful exerciſes or paſtimes, uſed by any perſon or perſons within their own pariſhes: and that every perſon and perſons offending in any of the ſaid premiſes, ſhall forfeit for every offence the ſum of three ſhillings and fourpence; the ſame to be employed and converted to the uſe of the poor of the pariſh where ſuch offence ſhall be committed." All this was perhaps proper, and ſhowed the diſtinguiſhed piety of this unfortunate monarch. But in this age likewiſe ended the manly ſports of Britons, and nothing was introduced that could compenſate for the loſs.

All theſe luſory arts, conſidered as vehicles of pleaſure, from the variety of their inventions, repreſent pleaſure as a fleeting phantom: evincing at the ſame time the ſtability of happineſs as ſpringing from internal order. Even reflex acts, pregnant with future hopes of ſolace and ſocial recreation, have more true feelings in expectancy than thoſe which ariſe from the object in poſſeſſion. Nay, pleaſure is found frequently in the imagination only: for Ixion's diſappointment frequently awaits us when we advance to embrace this Juno of our deſires.

Upon the whole, happineſs, the only thing of intrinſic value, muſt ariſe in the heart, and be ſomething more ſolid than what mere amuſement can poſſibly ſupply. Amuſements or paſtimes ought to be conſidered only as neceſſary relaxations from ſeverer and more uſeful employment; and in this point of view they may be ſafely purſued; but they become criminal when they occupy the place of the buſineſs of life.

PASTINACA, the PARSNEP, a genus of plants belonging to the pentandria claſs; and in the natural method ranking under the 45th order, *Umbellatæ*. See BOTANY *Index*.

PASTOPHORI, among the ancients, were prieſts whoſe office it was to carry the images, along with the ſhrines of the gods, at ſolemn feſtivals, when they were to pray to them for rain, fair weather, or the like. The Greeks had a college of this order of prieſts in Sylla's time. The cells or apartments near the temples, where the paſtophori lived, were called *paſtophoria*. There were ſeveral lodging rooms for the prieſts of a ſimilar kind in the temple of Jeruſalem.

PASTORAL, in general, ſomething that relates to ſhepherds: hence we ſay, paſtoral life, manners, poetry, &c.

Paſtoral life may be conſidered in three different views; either ſuch as it now actually is; when the ſtate of ſhepherds is reduced to be a mean, ſervile, and laborious ſtate; when their employments are become diſagreeable, and their ideas groſs and low; or ſuch as we may ſuppoſe it once to have been, in the more early and ſimple ages, when it was a life of eaſe and abundance; when the wealth of men conſiſted chiefly in flocks and herds, and the ſhepherd, though unrefined in his manners, was reſpectable in his ſtate: or, laſtly, ſuch as it never was, and never can in reality be, when, to the eaſe, innocence, and ſimplicity of the early ages, we attempt to add the poliſhed taſte, and cultivated manners of modern times. Of theſe three ſtates, the firſt is too groſs and mean, the laſt too refined and unnatural, to be made the groundwork of paſtoral poetry. Either of theſe extremes is a rock upon which the poet will ſplit, if he approach too near it. We will be diſguſted if he give us too much of the ſervile employments and low ideas of actual peaſants, as Theocritus is cenſured for having ſometimes done; and if, like ſome of the French and Italian writers of paſtorals he make his ſhepherds diſcourſe as if they were courtiers and ſcholars, he then retains the name only, but wants the ſpirit of paſtoral poetry.

Blair's Lectures vol. iii. p. 117

PASTORAL Poetry. See POETRY, Part II. ſect. 4.

PASTRY, that branch of cookery which is chiefly taken up in making pies, paſties, cakes, &c. See PASTE.

Dr Cullen obſerves, that paſte is very hard and indigeſtible without butter; and even with it, is apt to produce heartburn and aceſcency. Perhaps this is increaſed by the burned butter, from a certain ſenſibility in the ſtomach, which occaſions all empyreumatic oils to be long retained, and ſo produce acidity.

PASTURE, or PASTURE *Land*, is that reſerved for feeding cattle. See AGRICULTURE *Index*.

PATÆCI, in *Mythology*, images of gods which the Phœnicians carried on the prows of their gallies. Herodotus, lib. iv. calls them παταικοι. The word is Phœnician, and derived from *pethica*, i. e. *titulus*. See Bochart's Chanaan. lib. ii. cap. 3. But Scaliger does not agree. Morin derives it from πιθηκος, *monkey*, this animal having been an object of worſhip among the Egyptians, and hence might have been honoured by their

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knighthood. For at this juncture, he had ſuch a tremor upon him, that inſtead of laying the ſword upon the ſhoulder of the perſon to be knighted, he frequently would be obſerved almoſt to thruſt the point of it into the face of the party: which occaſioned thoſe about him to aſſiſt him in the direction of his hand.

their neighbours. Mr Elſner has obſerved, that Herodotus does not call the pataeci *gods*; but that they obtained this dignity from the liberality of Heſychius and Suidas, and other ancient lexicographers, who place them at the ſtern of ſhips; whereas Herodotus placed them at the prow. Scaliger, Bochart, and Selden, have taken ſome pains about this ſubject.—M. Morin has alſo given us a learned diſſertation on this head in the *Memoires de l'Acad. des Inſcript. et Belles Lettres*, tom. i.; but Mr Elſner thinks it defective in point of evidence.

PATAGONIA, a country of South America, comprehending all that country extending from Chili and Paraguay to the utmoſt extremity of South America; that is, from 35° almoſt to 54° of latitude: being ſurrounded by the countries juſt mentioned, the South and North ſeas, and the ſtraits of Magellan, which ſeparate it from the iſland called *Terra del Fuego*, and extend about 116 leagues in length from ſea to ſea, but only from half a league to three or four in breadth.

This country had the name of *Terra Magellanica*, from Ferdinand Magellan, a Portugueſe officer in the ſervice of the Catholic king, who is reported to have ſailed through the ſtraits that alſo bear his name, from the North to the South ſea, in the year 1519.

The lofty mountains of the Andes, which are covered with ſnow a great part of the year, traverſing the country from north to ſouth, the air is ſaid to be much colder than in the north under the ſame parallels of latitude. Towards the north, it is ſaid to be covered with wood, and ſtored with an inexhauſtible fund of large timber; whereas, to the ſouthward, not ſo much as a ſingle tree fit for any mechanical purpoſe is to be ſeen: yet there is good paſture, and incredible numbers of wild horned cattle and horſes, which were firſt brought hither by the Spaniards, and have increaſed amazingly. Freſh water, we are told by ſome writers, is very ſcarce; but if that were really the caſe, it is difficult to conceive how the preſent inhabitants and ſuch multitudes of cattle could ſubſiſt. The eaſt coaſt is moſtly low land, with few or no good harbours: one of the beſt is Port St Julian.

Patagonia is inhabited by a variety of Indian tribes; as the Patagons, from which the country takes its names; the Pampas, the Coſſares, &c. of whom we know very little. Only it appears, from the accounts of former voyagers, lately confirmed by Commodore Byron and his crew, and the teſtimonies of other navigators, that ſome of them are of a gigantic ſtature, and clothed with ſkins; but it would ſeem that there are others who go almoſt quite naked, notwithſtanding the inclemency of the climate. Some of them alſo, that live about the ſtraits, if we may credit the navigators who have paſſed that way into the South ſea, are perfect ſavages: but thoſe with whom Commodore Byron and his people converſed, are repreſented as of a more gentle, humane diſpoſition; only, like other ſavages, they live on fiſh and game, and the ſpontaneous productions of the earth.

The Spaniards once built a fort upon the ſtraits, and left a garriſon in it, to prevent any other European nation paſſing that way into the South ſea: but moſt of the men periſhed by famine, whence the place obtained the name of *Port Famine;* and no people have attempted to plant colonies here ever ſince.

About the middle of the ſtrait is a promontory called *Cape Froiſard*, which is the moſt ſoutherly on the continent of South America.

On the coaſts of Patagonia lie a great number of iſlands, or cluſters of iſlands. On the weſt coaſts are the iſlands Madre de Dios, Santa Trinidad, Santa Cruz, the iſles of the Chunians and Huillans, the Sarmientos, and many others; to the number of 80 in all, as ſome ſay. Of thoſe on the ſouth coaſt, the moſt conſiderable are *Terra del Fuego*, and *Staten Land*. See theſe articles.

A vaſt deal has been ſaid reſpecting the ſtature of the Patagonians, by people of different nations, and on various occaſions. We ſhall inſert the following letter from Mr Charles Clarke, who was on board Byron's ſhip in 1764, and gave this account to Dr Maty.

"We had not got above 10 or 12 leagues into the ſtraits of Magellan, from the Atlantic ocean, before we ſaw ſeveral people, ſome on horſeback, ſome on foot, upon the north ſhore (continent), and with the help of our glaſſes could perceive them beckoning to us to come on ſhore, and at the ſame time obſerved to each other, that they ſeemed to be of an extraordinary ſize: However, we continued to ſtand on, and ſhould have paſſed without taking the leaſt farther notice of them, could we have proceeded; but our breeze dying away, and the tide making againſt us, we were obliged to anchor; when the Commodore ordered his boat of 12 oars, and another of ſix, to be hoiſted out, manned, and armed. In the firſt went the Commodore, in the other Mr Cummins our firſt lieutenant, and myſelf. At our firſt leaving the ſhip, their number did not exceed 40; but as we approached the ſhore, we perceived them pouring down from all quarters, ſome galloping, others running, all making uſe of their utmoſt expedition. They collected themſelves into a body juſt at the place we ſteered off for. When we had got within 12 or 14 yards of the beach, we found it a diſagreeable flat ſhore, with very large ſtones, which we apprehended would injure the boats; ſo looked at two or three different places to find the moſt convenient for landing. They ſuppoſed we deferred coming on ſhore through apprehenſions of danger from them; upon which they all threw open the ſkins which were over their ſhoulders, which was the only clothing they had, and conſequently the only thing they could ſecret any kind of arms with, and many of them lay down cloſe to the water's edge.—The commodore made a motion for them to go a little way from the water, that we might have room to land, which they immediately complied with, and withdrew 30 or 40 yards; we then landed, and formed each man with his muſket, in caſe any violence ſhould be offered. As ſoon as we were formed, the commodore went from us to them, then at about 20 yards diſtance: they ſeemed vaſtly happy at his going among them, immediately gathered round him, and made a rude kind of noiſe, which I believe was their method of ſinging, as their countenances beſpoke it a ſpecies of jollity. The commodore then made a motion to them to ſit down, which they did in a circle, with him in the middle, when Mr Byron took ſome beads and ribbons, which he had brought for that purpoſe, and tied about the women's necks, with which they ſeemed infinitely pleaſed. We were ſtruck with the greateſt aſtoniſhment at the ſight of people of ſuch a gigantic ſtature, notwithſtanding our previous notice with glaſſes from the ſhip. Their body was increaſed, by the time we got in there, to the number of 500, men, women, and children. The men and women both rode in the ſame manner; the women had a kind of belt to cloſe their ſkins round the waiſt, which the men had not, as theirs were only ſlung over their ſhoulders, and tied with two little ſlips, cut from the ſkin, round the neck. At the time of the commodore's motion for them to retire farther up the beach, they all diſmounted, and turned their horſes looſe, which were gentle, and ſtood very quietly. The commodore having diſpoſed of all his preſents, and ſatisfied his curioſity, thought proper to retire; but they were vaſtly anxious to have him go up into the country to eat with them. That they wanted him to go with them to eat, we could very well underſtand by their motions, but their language was wholly unintelligible to us.—There was a very great ſmoke to which they pointed about a mile from us, where there muſt have been ſeveral fires; but ſome intervening hills prevented our ſeeing any thing but the ſmoke. The commodore returned the compliment, by inviting them on board the ſhip; but they would not favour him with their company; ſo we embarked, and returned to the ſhip. We were with them near two hours at noon-day within a very few yards, though none had the honour of ſhaking hands but Mr Byron and Mr Cummins; however, we were near enough, and long enough with them, to convince onr ſenſes, ſo far as not to be cavilled out of the very exiſtence of thoſe ſenſes at that time, which ſome of our countrymen and friends would abſolutely attempt to do. They are of a copper colour, with long black hair; and ſome of them are certainly nine feet, if they do not exceed it. The commodore, who is very near ſix feet, could but juſt reach the top of one of their heads, which he attempted on tip-toes, and there were ſeveral taller than the perſon on whom the experiment was tried. They are prodigious ſtout, and as well and as proportionally made as ever I ſaw people in my life. That they have ſome kind of arms among them, is, I think, indiſputable, from their taking methods to convince us they had none at that time about them. The women, I think, bear much the ſame proportion to the men as our Europeans do; there was hardly a man there leſs than eight feet, moſt of them conſiderably more. The women, I believe, run from ſeven and a half to eight feet.—Their horſes were ſtout and bony, but not remarkably tall; they are, in my opinion, from 15 to 15½ hands. They had a great number of dogs, about the ſize of a middling pointer, with a fox noſe. They continued on the beach till we got under way, which was two hours after we got on board. I believe they had ſome expectations of our returning again; but as ſoon as they ſaw us getting off, they betook themſelves to the country.

"The country of Patagonia is rather hilly, though not remarkably ſo. You have here and there a ridge of hills, but no very high ones. We lay ſome time at Port Deſire, which is not a great way to the northward of the ſtraits, where we traverſed the country many miles round. We found fire-brands in different places, which convinced us there had been people, and we ſuppoſe them to have been the Patagonians. The ſoil is ſandy, produces nothing but a coarſe harſh graſs, and a few ſmall ſhrubs, of which Sir John Narborough remarked, he could not find one of ſize enough to make the helve of a hatchet; which obſervation we found very juſt. It was ſome time in the winter we made this viſit to our gigantic friends. I am debarred being ſo particular as I could wiſh, from the loſs of my journals, which were demanded by their lordſhips of the admiralty immediately upon our return."

That the whole of this account is true, we cannot aſſert; but that the writer has been miſled in ſome reſpects, and miſinformed with regard to ſome of his facts, is at leaſt probable: for Captain Wallis, who went out to the ſtraits of Magellan after Byron's return, gives a different turn to many of the obſervations; and with reſpect to the ſtature of the people, he differs very materially. We ſhall give the following epitome of his remarks on what occurred to him.—He had three ſhips with him, which entered the ſtraits on the 10th December 1766, and came to an anchor in a bay ſouth of Cape Virgin Mary, where they were immediately accoſted by a whole troop of Patagonians, who made ſigns for them to come on ſhore. The captain, having made previous diſpoſitions for the ſecurity of his men in caſe of an attack, manned all the boats belonging to the three ſhips, and with a party of marines landed on the beach where thoſe giants had aſſembled. The commanders of the three ſhips, and moſt of their officers, were of this party. On their leaping aſhore, the Indians ſeemed to welcome them; and being by ſigns deſired to retreat, they all fell back, and made room for the marines to form. When they were drawn up, Captain Wallis advanced, and by ſigns directed the Indians to ſeat themſelves in a ſemicircle, which they readily underſtood and obeyed. He then diſtributed among them knives, ſciſſars, buttons, beads, combs, and particularly ribbons, with which he complimented the women, who received them with a mixture of pleaſure and reſpect. He then gave them to underſtand that he had ſtill more valuable articles to beſtow, and ſhowed them axes and bill hooks; but, at the ſame time, pointed to ſome guanicoes and oſtriches, intimating that he expected ſome of thoſe in return: but they either did not, or would not, underſtand him; ſo that no traffic took place.

The whole company that were aſſembled on this occaſion, had each a horſe, with a ſaddle and bridle. The ſaddle had a ſort of ſtirrups, and the bridle was made of thongs of leather very well put together, for the purpoſe of guiding the horſes. The women, as well as the men, rode aſtride. The men, in general, wore each a wooden ſpur: but one of them had a large pair of Spaniſh ſpurs, braſs ſtirrups, and a Spaniſh ſcimitar. Their horſes were nimble and ſpirited, but ſmall in proportion to their riders, ſeemingly not above 14 hands high. Their dogs were of the Spaniſh breed. The captain, having purpoſely provided himſelf with meaſuring rods, found that the talleſt man among them meaſured only ſix feet ſeven inches high; ſeveral were within an inch or two as tall; but the ordinary ſize was from five feet ten inches to ſix feet. It is pity that none of our voyagers thought of meaſuring the whole ſize of one of thoſe gigantic men. They tell us, indeed, that they are well made, that they are proportionally large, and that they are robuſt and bony; but they give us no criterion to judge of their bulk, nor one inſtance of their extraordinary ſtrength. As they are repreſented not only

Patagonia. peaceable, but remarkably tractable, ſome trials might have been made of the weight they could have lifted, and how much they could exceed in that reſpect the ſtrongeſt men in the ſhips. This, in a great meaſure, would have determined the point, which is yet left doubtful by the different relations that are given by the different voyagers who have ſeen theſe people, no two of them agreeing in the ſame deſcription. All agree, however, that their hair is black, and harſh like briſtles; that they are of a dark copper colour, and that their features are rather handſome than ugly; that they clothe themſelves decently with the ſkins of guanicoes; that they paint themſelves variouſly; and there is reaſon to ſuſpect, that by that variety they diſtinguiſh their tribes. Thoſe ſeen by Commodore Byron were painted round both eyes, no two of them alike; thoſe ſeen by Captain Wallis had only a red circle round the left eye; and thoſe ſeen by Bougainville had no circle round the eyes, but had their cheeks painted red. This may account for the different reports of voyagers concerning their ſtature: it is not impoſſible, nay, it is very probable, that they may vary in this particular, according to their tribes; as is ſeen in the Highlands of Scotland, where one clan of the Campbells is remarkably tall, and another of the Fraſers remarkably ſhort. Were it not for ſome ſuch natural diſcrimination, there could not be ſo wide a difference in the deſcriptions of gentlemen, who, having no ends to ſerve, either in falſifying one another's reports, or in impoſing upon the public, cannot be ſuppoſed to miſtake willfully.

One remarkable obſervation made by our voyagers muſt not be omitted; and that is, that though our people could diſtinguiſh but one word of their language. which the Engliſh pronounce *chewow*, and the French *ſhawa*, yet the Patagonians could repeat whole ſentences after our men more diſtinctly than almoſt any European foreigner of what nation ſoever. This appears the more ſingular, as, among the iſlanders between the tropics, it was hardly poſſible to make them articulate any of our words. Sydney Parkinſon, in a ſpecimen he has given us, ſays, that though the Engliſh remained at Otaheite three months, the neareſt the natives could approach the ſound of *Cook* was *Toote*; *Banks*, *Opane*; *Solander*, *Tolano*; *Gore*, *Towara*; *Monkhouſe*, *Mata*; and ſo of the reſt: whereas the Patagonians preſently got by heart this ſentence of invitation, *Come aſhore, Engliſhmen!* which they ſhowed they well underſtood, by repeating it afterwards whenever the ſhips came ſo near the ſhore as to be within call.

Another very remarkable particular is, that they had none of the characters of a ferocious people; there was no offenſive weapon among them, except the ſcimitar already mentioned. The men, indeed, had a kind of ſling, which they uſe in hunting, conſiſting of two round ſtones of about a pound weight each, connected together by a thong. Theſe ſtones were faſtened to the extremities of the thong; and, when they threw them, they held one ſtone in the hand, and ſwung the other about the head. "They are ſo expert in the management of this double-headed ſhot (ſays the writer of the voyage), that they will hit a mark not bigger than a ſhilling with both theſe ſtones at the diſtance of fifteen yards; but their method of availing themſelves of their dexterity againſt the guanicoe and oſtrich is, to fling the ſtones ſo as to entangle their legs, by which means they are retarded in their flight, and eaſily overtaken. Bougainville ſpeaks of theſe ſlings as common among other Indian nations in South America; but we do not remember to have ſeen this aſſertion confirmed by any other voyager.

Patagonia, Patavinity.

Theſe people certainly dreſs differently as well as paint differently; for the dreſs deſcribed by Bougainville is very unlike the dreſs of thoſe ſeen by the Engliſh voyagers. Captain Wallis invited ſome of them on board his ſhip: but, among all the wonders that were ſhown them, none ſeemed to attract their notice ſo much as the looking-glaſſes: they looked in the glaſſes and at each other; they laughed and gazed, and gazed again and laughed; in ſhort, there was no end to their merriment when in poſſeſſion of this article of curioſity. They ate whatever was given them, but would drink nothing but water. In this they differ from all the tribes of Indians in North America, who are immoderately fond of ſpirituous liquors. They admired the European ſheep, hogs, and poultry; but did not ſeem over-deſirous of any thing they ſaw except clothes. When the marines were exerciſed to entertain them, they appeared diſconcerted; an old man among them made ſigns, by ſtriking his breaſt, and tumbling down and lying as if he had been dead upon deck, that he knew the effect of their guns; and none of them ſeemed eaſy till the firing was over. When the Captain had ſatisfied his own curioſity, and, as he imagined, theirs, he gave them to underſtand, that he was going to ſail, and that they muſt depart; which they were very unwilling to do. However, having given each of them a canvas bag, with ſome needles ready threaded, a knife, a pair of ſciſſars, a few beads, a comb, and a looking-glaſs, he diſmiſſed them, with great reluctance on their part, particularly on that of the old man's, who by very ſignificant ſigns expreſſed his deſire to ſtay till ſunſet.

PATAGONULA, in *Botany*, a genus of plants belonging to the pentandria claſs. See Botany *Index*.

PATAN, a kingdom of Aſia, in the Eaſt Indies, and in the peninſula of Malacca, and on the eaſtern coaſt between the kingdoms of Siam and Paha. The inhabitants are partly Mahometans and partly Gentoos; but they are all very voluptuous. The air is wholeſome, though very hot; and they have no ſeaſons but the winter and ſummer. The former is more properly the rainy ſeaſon; and contains the months of November, December, and January. The woods are full of elephants and many wild animals. Some voyagers pretend that this country is governed by a queen, who never marries, but may have as many gallants as ſhe pleaſes. They have ſome trade with the Chineſe; and the principal town is of the ſame name, which is one of the ſtrongeſt in theſe parts, having a well defended harbour.

Patan, a town of Aſia, and capital of a province of the ſame name, in the dominions of the Great Mogul; it is very little known. E. Long. 109. 0. N. Lat. 27. 30.

PATAVINITY, among critics, denotes a peculiarity of Livy's diction; derived from Patavium or Padua, the place of his nativity; but wherein this patavinity conſiſts, they are by no means agreed.

Aſinius Pollio, according to Quintilian, taxed Livy with patavinity. But what he meant by this cenſure

Patara
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Patella.

we believe no man can ſay. Morhof believes it to be a ſingular turn of expreſſion, and ſome phraſes peculiar to the Paduans. All we certainly know about it is, that it was a fault in the language of Livy, not in the ſentiments or manners. In all probability, it is one of thoſe delicacies that are loſt in a dead language. Dan. Georg. Morhof publiſhed a treatiſe *De Patavinitate Liviana*, at Kiel, in 1685, where he explains, very learnedly, the urbanity and peregrinity of the Latin tongue.

PATARA, Livy, Mela; the capital of Lycia, to the eaſt of the mouth of the river Xanthus; famous for a temple and oracle of Apollo, thence called *Patareus*, three ſyllables only; but *Patareus*, (Horace). For the ſix winter months, Apollo gave anſwers at Patara; and for the ſix ſummer at Delos, (Virgil, Servius): theſe are the *Lyciæ Sortes* of Virgil. The town was ſituated in a peninſula, called *Lyciorum Cherſoneſus*, (Stephanus). Acts xxi. 1. St Paul in his paſſage from Philippi to Jeruſalem, came to Miletus, hence to Coos, then to Rhodes, and from Rhodes to Patara; where having found a ſhip that was bound for Phœnicia, he went on board and arrived at Jeruſalem, to be at the feaſt of Pentecoſt.

PATAVIUM (Tacitus, Strabo), a town of the Tranſpadana, ſituated on the left or north bank of the Medoacus Minor; founded by Antenor the Trojan, (Mela, Virgil, Seneca); *Patavini*, the people, (Livy); who himſelf was a native, and by Aſinius Pollio charged with patavinity. Now *Padua*, in the territory and to the weſt of Venice. E. Long. 12. 15. N. Lat. 45. 30.

PATAY, a town of France, in the province of Orleannois, remarkable for the defeat of the Engliſh in 1429, and where Joan of Arc did wonders. E. Long. 1. 43. N. Lat. 48. 5.

PATE, in *Fortification*, a kind of platform, reſembling what is called an *horſe's ſhoe*.

PATEE, or PATTEE, in *Heraldry*, a croſs, ſmall in the centre, and widening to the extremities, which are very broad.

PATELLA, or KNEE-PAN, in *Anatomy*. See ANATOMY *Index*.

PATELLA, or LIMPET, a genus of ſhell-fiſh belonging to the order of vermes teſtacea. See CONCHOLOGY *Index*.

PATELLA, in the Hiſtory of Inſects, a name given by Liſter and other authors to a little huſk or ſhell, found on the bark of the cherry, plum, roſe, and other trees, containing an animal within, and uſeful in colouring. Theſe patellæ are of the form of globes, except where they adhere to the tree, and are for the moſt part of a ſhining cheſnut colour. The huſk itſelf ſtrikes a very fine crimſon colour on paper, and within it is found a white maggot which is of no value: this, in time, hatches into a very ſmall but beautiful bee. The ſize of this bee is about half that of an ant. They have a ſting like bees, and three ſpots placed in a triangle on the forehead, which are ſuppoſed to be eyes. They are of a black colour, and have a large round whitiſh or pale yellow ſpot on the back. The upper pair of wings are ſhaded and ſpotted, but the under pair are clear. It might be worth while to try the ſhells or huſks in order to diſcover whether the colour they yield might not be uſeful. It is to be remarked, that the deepeſt coloured huſks afford the fineſt and deepeſt purple: they muſt be uſed while the animal in them is in the maggot form; for when it is changed into the bee ſtate the ſhell is dry and colourleſs. Liſter, who firſt obſerved theſe patellæ, went ſo far on comparing them with the common kermes, as to aſſert that they were of the ſame nature with that production: but his account of their being the workmanſhip of a bee, to preſerve her young maggot in, is not agreeable to the true hiſtory of the kermes; for that is an inſect of a very peculiar kind. He has in other inſtances been too juſtly cenſured for his precipitancy of judging of things, and perhaps has fallen into an error by means of it here. It is very poſſible that theſe patellæ may be the ſame ſort of animals with the kermes, but then it produces its young within this ſhell or huſk, which is no other than the ſkin of the body of the mother animal; but as there are many flies whoſe worms or maggots are lodged in the bodies of other animals, it may be that this little bee may love to lay its egg in the body of the proper inſect, and the maggot hatched from that egg may eat up the proper progeny, and, undergoing its own natural changes there, iſſue out at length in form of the bee. This may have been the caſe in ſome few which Dr Liſter examined; and he may have been miſled by this to ſuppoſe it the natural change of the inſect.

Patella
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Patera.

PATENT, in general, denotes ſomething that ſtands open or expanded: thus a leaf is ſaid to be patent, when it ſtands almoſt at right angles with the ſtalk.

PATENT, or *Letters Patent*. See LETTER.

PATER NOSTER, the *Lord's Prayer*, ſo called from the two firſt words thereof in Latin.

PATER Noſter, iſlands of Aſia, in the Eaſt Indian ſea, ſo called becauſe of the great number of rocks, which ſailors have likened to the beads with which the Papiſts tell their pater-noſter. They abound in corn and fruits, and are very populous.

PATER Patratus, was the name of the firſt and principal perſon in the college of heralds called *Feciales*. Some ſay the Pater Patratus was a conſtant officer and perpetual chief of that body; and others ſuppoſe him to have been a temporary miniſter, elected upon account of making peace or denouncing war, which were both done by him. See FECIALES.

PATERA, among antiquaries, a goblet or veſſel uſed by the Romans in their ſacrifices; wherein they offered their conſecrated meats to the gods, and wherewith they made libations. See SACRIFICE and LIBATION.

The word is Latin, formed from *pateo*, "I am open;" *quod pateat*, "becauſe it has a great aperture;" in contradiſtinction to bottles, &c. which have only narrow necks, or whoſe aperture is leſs than the body of the veſſel.

On medals the patera is ſeen in the hands of ſeveral deities; and frequently in the hands of princes, to mark the ſacerdotal authority joined with the imperial, &c.

Hence F. Joubert obſerves, that beſides the patera, there is frequently an altar upon which the patera ſeems to be pouring its contents.

The patera was of gold, ſilver, marble, braſs, glaſs, or earth; and they uſed to incloſe it in urns with the aſhes of the deceaſed, after it had ſerved for the libations of the wine and liquors at the funeral.

The patera is an ornament in architecture, frequently ſeen in the Doric freeze, and the tympans of arches; and they are ſometimes uſed by themſelves, to ornament a ſpace; and in this caſe it is common to hang a ſtring of huſks or drapery over them: ſometimes they are much enriched with foliage, and have a maſk or a head in the centre.

PATERCULUS, Caius Velleius, an ancient Roman hiſtorian, who flouriſhed in the reign of Tiberius Cæſar, was born in the year of Rome 735. His anceſtors were illuſtrious for their merit and their offices. His grandfather eſpouſed the party of Tiberius Nero, the emperor's father; but being old and infirm, and not able to accompany Nero when he retired from Naples, he ran himſelf through with his ſword. His father was a ſoldier of rank, and ſo was Paterculus himſelf. He was a military tribune when Caius Cæſar, a grandſon of Auguſtus, had an interview with the king of the Parthians, in an iſland of the river Euphrates, in the year 753. He commanded the cavalry in Germany under Tiberius; and accompanied that prince for nine years ſucceſſively in all his expeditions. He received honourable rewards from him; but we do not find that he was preferred to any higher dignity than the prætorſhip. The praiſes he beſtows upon Sejanus give ſome probability to the conjecture, that he was looked upon as a friend of this favourite, and conſequently that he was involved in his ruin. His death is placed by Mr Dodwell in the year of Rome 784, when he was in his 50th year.

He wrote an abridgement of the Roman Hiſtory in two books, which is very curious. His purpoſe was only to deduce things from the foundation of Rome to the time wherein he lived; but he began his work with things previous to that memorable era: for, though the beginning of his firſt book is wanting, we yet find in what remains of it, an account of many cities more ancient than Rome. He promiſed a larger hiſtory; and no doubt would have executed it well: for during his military expeditions he had ſeen, as he tells us, the provinces of Thrace, Macedonia, Achaia, Aſia Minor, and other more eaſterly regions; eſpecially upon the ſhores of the Euxine ſea, which had furniſhed his mind with much entertaining and uſeful knowledge. In the Abridgement which we have, many particulars are related that are nowhere elſe to be found; and this makes it the more valuable. The ſtyle of Paterculus, though miſerably diſguiſed through the careleſſneſs of tranſcribers, and impoſſible to be reſtored to purity for want of manuſcripts, is yet manifeſtly worthy of his age, which was the time of pure Latinity. The greateſt excellence of this hiſtorian lies in his manner of commending and blaming thoſe he ſpeaks of; which he does in the fineſt terms and moſt delicate expreſſions. He is, however, condemned, and indeed with the greateſt reaſon, for his partiality to the houſe of Auguſtus; and for making the moſt extravagant eulogies, not only upon Tiberius, but even upon his favourite *Sejanus:* whom, though a vile and cruel monſter, Paterculus celebrates as one of the moſt excellent perſons the Roman commonwealth had produced. Lipſius, though he praiſes him in other reſpects, yet cenſures him moſt ſeverely for his inſincerity and partiality. "Velleius Paterculus (ſays he) raiſes my indignation: he repreſents Sejanus as endowed with all good qualities. The impudence of this hiſtorian! But we know that he was born, and died, to the deſtruction of mankind. After many commendations, he concludes, that Livia was a woman more reſembling the gods than men: and as to Tiberius, he thinks it a crime to ſpeak otherwiſe of him than as of an immortal Jove. What ſincere and honeſt mind can bear this? On the other hand, how artfully does he everywhere conceal the great qualities of Cæſar Germanicus! how obliquely does he ruin the reputation of Agrippina and others, whom Tiberius was thought to hate! In ſhort, he is nothing but a court-proſtitute. You will ſay, perhaps, it was unſafe to ſpeak the truth at thoſe times: I grant it; but if he could not write the truth, he ought not to have written lies: none are called to account for ſilence." La Mothe le Vayar has made a very juſt remark upon this occaſion: "The ſame fault (ſays he) may be obſerved in many others, who have written the hiſtory of their own times, with a deſign to be publiſhed while they lived."

It is ſtrange, that a work ſo elegant and worthy to be preſerved, and of which, by reaſon of its ſhortneſs, copies might be ſo eaſily taken, ſhould have been ſo near being loſt. One manuſcript only has had the luck to be found, as well of this author among the Latins as of Heſychius among the Greeks: in which, ſays a great critic of our own nation, "The faults of the ſcribes are found ſo numerous, and the defects ſo beyond all redreſs, that notwithſtanding the pains of the learned and moſt acute critics for two whole centuries, theſe books ſtill are, and are like to continue, a mere heap of errors." No ancient author but Priſcian makes mention of Paterculus: the moderns have done him infinitely more juſtice, and have illuſtrated him with notes and commentaries. He was firſt publiſhed, from the manuſcript of Morbac, by Rhenanus, at Baſil in 1520: afterwards by Lipſius at Leyden in 1581; then by Gerard Voſſius in 1639; next by Boeclerus at Straſburg in 1642; then by Thyſius and others; and, laſtly, by Peter Burman at Leyden, 1719, in 8vo. To the Oxford edition in 1693, 8vo, were prefixed the *Annales Velleiani* of Mr Dodwell, which ſhow deep learning and a great knowledge of antiquity.

PATH, in general, denotes the courſe or track marked out or run over by a body in motion.

For the path of the moon, &c. ſee MOON, &c. ASTRONOMY *Index*.

PATHETIC, whatever relates to the paſſions, or that is proper to excite or awake them. The word comes from the Greek παθος, *paſſion* or *emotion*. See PASSION.

PATHETIC, in *Muſic*, ſomething very moving, expreſſive, or paſſionate; capable of exciting pity, compaſſion, anger, or other paſſions. Thus we ſpeak of the pathetic ſtyle, a pathetic figure, pathetic ſong, &c. The chromatic genus, with its greater and leſſer ſemitones, either aſcending or deſcending, is very proper for the pathetic; as is alſo an artful management of diſcords; with a variety of motions, now briſk, now languiſhing, now ſwift, now ſlow.

Nieuwentyt ſpeaks of a muſician at Venice who ſo excelled in the pathetic, that he was able to play any of his auditors into diſtraction: he ſays alſo, that the great means he made uſe of it was the variety of motions, &c.

PATHOGNOMONIC, among *Phyſicians*, an appellation for a ſymptom, or concourſe of ſymptoms, that are inſeparable from a diſtemper, and are found in that only, and in no other.

PATHOLOGY, that part of medicine which explains the nature of diſeaſes, their cauſes and ſymptoms. See MEDICINE.

PATHOS, a Greek term, literally ſignifying paſſion.

PATHROS, a city and canton of Egypt, of which the prophets Jeremiah and Ezekiel make mention; Jerem. xliv. 1. 15. Ezek. xxix. 14. xxx. 14. We do not very well know its ſituation, though Pliny and Ptolemy the geographer ſpeak of it by the name of Phaturis; and it appears to have been in Upper Egypt. Iſaiah (xii. 2.) calls it Pathros; and it is the country of the Pathruſim, the poſterity of Mizraim, of whom Moſes ſpeaks, Gen. x. 14. Ezekiel threatens them with an entire ruin. The Jews retired thither notwithſtanding the remonſtrances of Jeremiah; and the Lord ſays by Iſaiah, that he will bring them back from thence.

PATIENCE, that calm and unruffled temper with which a good man bears the evils of life, from a conviction that they are at leaſt permitted, if not ſent, by the beſt of Beings, who makes all things work together for good to thoſe who love and fear him.

The evils by which life is embittered may be reduced to theſe four: 1. Natural evils, or thoſe to which we are by nature ſubject as men, and as periſhable animals. The greateſt of theſe are, the death of thoſe whom we love, and of ourſelves. 2. Thoſe from which we might be exempted by a virtuous and prudent conduct, but which are the inſeparable conſequences of imprudence or vice, which we ſhall call puniſhments; as infamy proceeding from fraud, poverty from prodigality, debility and diſeaſe from intemperance. 3. Thoſe by which the fortitude of the good are exerciſed; ſuch as the perſecutions raiſed againſt them by the wicked. To theſe may be added, 4. The oppoſition againſt which we muſt perpetually ſtruggle, ariſing from the diverſity of ſentiments, manners, and characters of the perſons among whom we live.

Under all theſe evils patience is not only neceſſary but uſeful: it is neceſſary, becauſe the laws of nature have made it a duty, and to murmur againſt natural events is to affront providence; it is uſeful, becauſe it renders our ſufferings lighter, ſhorter, and leſs dangerous.

Is your reputation ſullied by invidious calumnies? rejoice that your character cannot ſuffer but by falſe imputations. You are arraigned in a court of judicature, and are unjuſtly condemned: paſſion has influenced both your proſecutor and your judge, and you cannot forbear repining that you ſuffer although innocent. But would it have been better that you ſhould have ſuffered being guilty? Would the greateſt misfortune that can befal a virtuous man be to you a conſolation? The opulence of a villain, the elevated ſtation to which he is raiſed, and the honours that are paid to him, excite your jealouſy, and fill your boſom with repinings and regret. What! ſay you, are riches, dignity, and power, reſerved for ſuch wretches as this? Ceaſe theſe groundleſs murmurs. If the poſſeſſions you regret were real benefits, they would be taken from the wicked and transferred to you. What would you ſay of a ſucceſsful hero, who, having delivered his country, ſhould complain that his ſervices were ill requited, becauſe a few ſugar-plums were diſtributed to ſome children in his preſence, of which they had not offered him a ſhare? Ridiculous as this would appear, your complaints are no better founded. Has the Lord of all no reward to confer on you but periſhable riches and empty precarious honour?

It is fancy, not the reaſon of things, that makes life ſo uneaſy to us. It is not the place nor the condition, but the mind alone, that can make any body happy or miſerable.

He that values himſelf upon conſcience, not opinion, never heeds reproaches. When we are evil ſpoken of, if we have not deſerved it, we are never the worſe; if we have, we ſhould mend.

Tiberius the Roman emperor, at the beginning of his reign, acted in moſt things like a truly generous, good natured, and clement prince. All ſlanderous reports, libels, and lampoons upon him and his adminiſtration, he bore with extraordinary patience; ſaying, "That in a free ſtate the thoughts and tongues of every man ought to be free;" and when the ſenate would have proceeded againſt ſome who had publiſhed libels againſt him, he would not conſent to it; ſaying, "We have not time enough to attend to ſuch trifles; if you once open a door to ſuch informations, you will be able to do nothing elſe; for under that pretence every man will revenge himſelf upon his enemies by accuſing them to you." Being informed that one had ſpoken detractingly of him: "If he ſpeak ill of me," ſays he, "I will give him as good an account of my words and actions as I can; and if that be not ſufficient, I will ſatisfy myſelf with having as bad an opinion of him as he has of me." Thus far even Tiberius may be an example to others.

Men will have the ſame veneration for a perſon who ſuffers adverſity without dejection, as for demoliſhed temples, the very ruins of which are reverenced and adored.

A virtuous and well-diſpoſed perſon, is like to good metal; the more he is fired, the more he is refined; the more he is oppoſed, the more he is approved; wrongs may well try him and touch him, but cannot imprint in him any falſe ſtamp.

The man therefore who poſſeſſes this virtue (patience), in this ample ſenſe of it, ſtands upon an eminence, and ſees human things below him: the tempeſt indeed may reach him; but he ſtands ſecure and collected againſt it upon the baſis of conſcious virtue, which the ſevereſt ſtorms can ſeldom ſhake, and never overthrow.

Patience, however, is by no means incompatible with ſenſibility, which, with all its inconveniences, is to be cheriſhed by thoſe who underſtand and wiſh to maintain the dignity of their nature. To feel for others, diſpoſes us to exerciſe the amiable virtue of charity, which our religion indiſpenſably requires. It conſtitutes that enlarged benevolence which philoſophy inculcates, and which is indeed comprehended in Chriſtian charity. It is the privilege and the ornament of man; and the pain which it cauſes is abundantly recompenſed by that ſweet ſenſation which ever accompanies the exerciſe of beneficence.

To feel our own miſery with full force is not to be deprecated. Affliction ſoftens and improves the heart. Tears, to ſpeak in the ſtyle of figure, fertilize the ſoil in which the virtues grow. And it is the remark of one who underſtood human nature, that the faculties of the mind, as well as the feelings of the heart, are meliorated by adverſity.

But in order to promote theſe ends, our ſufferings muſt not be permitted to overwhelm us. We muſt oppoſe them with the arms of reaſon and religion; and to expreſs the idea in the language of the philoſopher, as well as the poet, of Nature, every one, while he is compelled to feel his misfortunes like a man, ſhould reſolve alſo to bear them like a man.

Reſign'd in ev'ry ſtate,
With patience bear, with prudence puſh, your fate;
By ſuffering well our fortune we ſubdue,
Fly when ſhe frowns, and when ſhe calls purſue.

PATIGUMO (a corruption of the words *pate-de guimauve*); the name of a ſort of paſte or cakes much uſed on the continent as an agreeable and uſeful remedy for catarrhal defluxions, and ſuppoſed by Dr Percival to conſiſt of gum-arabic combined with ſugar and the whites of eggs (ſee the article HUNGER). But we have been informed that the powdered ſubſtance of the marſhmallow is the chief ingredient of the compoſition.

PATIN, Guy, profeſſor of phyſic in the royal college of Paris, was born in 1602. He made his way into the world merely by the force of his genius, being at firſt corrector of a printing-houſe. He was a man of great wit and erudition: he ſpoke with the gravity of a Stoic, but his expreſſions were very ſatirical. He hated bigotry, ſuperſtition, and knavery; had an upright ſoul, and a well-diſpoſed heart. He was a moſt tender father, courteous to every body, and polite in the higheſt degree. He died in 1672, and did not owe his reputation to any writings publiſhed in his lifetime upon phyſic; but his letters which appeared after his death have rendered his name famous. He left a ſon mentioned in the enſuing article.

PATIN, *Charles*, who made a great figure in the world, and excelled in the knowledge of medals. He was born in Paris in 1633; and made ſo ſurpriſing a progreſs, that he maintained theſes in Greek and Latin, on all parts of philoſophy, in 1647. He ſtudied the law in compliance to an uncle, and was admitted an advocate in the parliament of Paris; but could not lay aſide that of phyſic, for which he always had an inclination. He therefore quitted the law, and devoted himſelf to phyſic; in which, after taking the doctor's degree, he applied himſelf to practice with great ſucceſs. He afterwards travelled into Germany, Holland, England, Switzerland, and Italy. In 1676 he was appointed profeſſor of phyſic in Padua; and three years after was created a knight of St Mark. He died in that city in 1694. His works are many, and well known to the learned world. His wife too, and his daughters, were authoreſſes.

PATKUL, John Reinhold, was born of a noble family in Livonia, a northern province belonging to the crown of Sweden. The Livonians having been ſtript of their privileges, and great part of their eſtates, by Charles XI. Patkul was deputed to make their complaint; which he did with ſuch eloquence and courage, that the king, laying his hand upon his ſhoulder, ſaid, 'You have ſpoken for your country as a brave man ſhould, and I eſteem you for it.'

Charles, however, who added the baſeneſs of hypocriſy to the ferocity of a tyrant, was determined to puniſh the zeal and honeſty which he thought fit to commend; and a few days afterwards cauſed Patkul to be declared guilty of high treaſon, and condemned to die. Patkul, however, found means to eſcape into Poland, where he continued till Charles was dead. He hoped that his ſentence would have been then reverſed, as it had been declared unjuſt even by the tyrant that procured it: but being diſappointed in this expectation, he applied to Auguſtus king of Poland, and ſolicited him to attempt the conqueſt of Livonia from the Swedes; which, he ſaid, might be eaſily effected, as the people were ready to ſhake off their yoke, and the king of Sweden was a child incapable of compelling their ſubjection.

Auguſtus poſſeſſed himſelf of Livonia in conſequence of this propoſal; and afterwards, when Charles XII. entered the province to recover it, Patkul commanded in the Saxon army againſt him. Charles was victorious; and Patkul, ſome time afterwards, being diſguſted at the haughty behaviour of General Fleming, Auguſtus's favourite, entered into the ſervice of the Czar, with whom Auguſtus was in ſtrict alliance, and a little before Charles compelled Auguſtus to abdicate the throne of Poland, and his ſubjects to elect Staniſlaus in his ſtead. The Czar ſent Patkul, with the title of his ambaſſador, into Saxony, to prevail with Auguſtus to meet him at Grodno, that they might confer on the ſtate of their affairs. This conference took place; and immediately afterwards the Czar went from Grodno to quell a rebellion in Aſtracan. As ſoon as the Czar was gone, Auguſtus, to the ſurpriſe of all Europe, ordered Patkul, who was then at Dreſden, to be ſeized as a ſtate criminal. By this injurious and unprecedented action, Auguſtus at once violated the law of nations, and weakened his own intereſt; for Patkul was not only an ambaſſador, but an ambaſſador from the only power that could afford him protection. The cauſe, however, was this: Patkul had diſcovered that Auguſtus's miniſters were to propoſe a peace to Charles upon any terms; and had therefore formed a deſign to be beforehand with them, and procure a ſeparate peace between Charles and his new maſter the Czar. The deſign of Patkul was diſcovered; and, to prevent its ſucceſs, Auguſtus ventured to ſeize his perſon, aſſuring the Czar that he was a traitor, and had betrayed them both.

Auguſtus was ſoon after reduced to beg a peace of Charles at any rate; and Charles granted it upon certain conditions, one of which was, that he ſhould deliver up Patkul. This condition reduced Auguſtus to a very diſtreſsful dilemma: the Czar, at this very time, reclaimed Patkul as his ambaſſador; and Charles demanded, with threats, that he ſhould be put into his hands. Auguſtus therefore contrived an expedient by which he hoped to ſatisfy both: he ſent ſome guards to deliver Patkul, who was priſoner in the caſtle of Konigſtein, to the Swediſh troops; but by ſecret orders,

ders privately diſpatched, he commanded the governor to let him eſcape. The governor, though he received this order in time, yet diſappointed its intention by his villany and his avarice. He knew Patkul to be very rich; and having it now in his power to ſuffer him to eſcape with impunity, he demanded of Patkul a large ſum for the favour. Patkul refuſed to buy that liberty which he made no doubt would be gratuitouſly reſtored, in conſequence of the Czar's requiſition and remonſtrance; and, in the mean time, the Swediſh guards arrived with the order for his being delivered up to them. By this party he was firſt carried to Charles's head quarters at Albranſtadt, where he continued three months, bound to a ſtake with a heavy chain of iron. He was then conducted to Caſimir, where Charles ordered him to be tried; and he was by his judges found guilty. His ſentence depended upon the king; and after having been kept a priſoner ſome months, under a guard of Meyerfeldt's regiment, uncertain of his fate, he was, on the 25th of September 1707, towards the evening, delivered into the cuſtody of a regiment of dragoons, commanded by Colonel Nicholas Hielm. On the next day, the 26th, the colonel took the chaplain of his regiment aſide, and telling him that Patkul was to die the following day, ordered him to acquaint him with his fate, and prepare him for it. About this very time he was to have been married to a Saxon lady of great quality, virtue, and beauty; a circumſtance which renders his caſe ſtill more affecting. What followed in conſequence of the colonel's order to the miniſter will be related in his own words.

"Immediately after evening ſervice I went to his priſon, where I found him lying on his bed. The firſt compliments over, I entered upon the melancholy duty of my profeſſion, and turning to the officer who had him in charge, told him the colonel's orders were, that I ſhould be alone with his priſoner. The officer having withdrawn, Patkul graſping both my hands in his, cried out with moſt affecting anxiety and diſtreſs, My dear paſtor! what are you to declare? what am I to hear? I bring you, replied I, the ſame tidings that the prophet brought to King Hezekiah, *Set thine houſe in order, for thou muſt die.* To morrow by this time thou ſhalt be no longer in the number of the living! At this terrible warning he bowed himſelf upon his bed and burſt into tears. I attempted to comfort him, by ſaying that he muſt, without all doubt, have often meditated on this ſubject: Yes, cried he, I know, alas! too well, that we muſt all die; but the death prepared for me will be cruel and inſupportable. I aſſured him that the manner of his death was to me totally unknown; but, believing that he would be prepared for it, I was ſure his ſoul would be received into the number of happy ſpirits. Here he roſe up, and folding his hands together, Merciful Jeſus! let me then die the death of the righteous! A little after, with his face inclined to the wall, where ſtood his bed, he broke out into this ſoliloquy: Auguſtus! O Auguſtus, what muſt be thy lot one day! Muſt thou not anſwer for all the crimes thou haſt committed? He then obſerved that he was driven out from his country, by a ſentence againſt his life, pronounced for doing what the king himſelf encouraged him to do, ſaying to him one day in terms of much kindneſs, 'Patkul maintain the rights of your country like a man of honour, and with all the ſpirit you are capable of.' That flying into an enemy's country was alſo unavoidable, as the country of an ally would not have afforded him protection; but that he was in Saxony a wretched exile, not a counſellor or adviſer; that before his arrival every thing was already planned, the alliance with Muſcovy ſigned, and the meaſures with Denmark agreed upon. 'My inclination (ſaid he, after a pauſe) were always to ſerve Sweden, though the contrary opinion has prevailed. The elector of Brandenburg owed his title of *king of Pruſſia* to the ſervices I did him; and when, in recompenſe, he would have given me a conſiderable ſum of money, I thanked him, and rejected the offer; adding, that the reward I moſt wiſhed for was to regain the king of Sweden's favour by his interceſſion. This he promiſed, and tried every poſſible method to ſucceed, but without ſucceſs. After this I laboured ſo much for the intereſt of the late emperor in his Spaniſh affairs, that I brought about what ſcarce any other man could have effected. The emperor as an acknowledgement gave me an aſſignment for 50,000 crowns, which I humbly laid at his feet, and only implored his imperial majeſty's recommendation of me to my king's favour: this requeſt he immediately granted, and gave his orders accordingly, but in vain. Yet, not to loſe any opportunity, I went to Moſcow while the Swediſh ambaſſadors were at that court; but even the mediation of the Czar had no effect. After that I diſtributed among the Swediſh priſoners at Moſcow at leaſt 100,000 crowns, to ſhow the ardent deſire I had, by all ways, to regain the favour of their ſovereign. Would to heaven I had been equally in earneſt to obtain the grace of God.'—At theſe words another ſhower of tears fell from his eyes, and he remained for ſome moments ſilent, and overwhelmed with grief. I uſed my beſt endeavours to comfort him with the aſſurance that this grace would not be denied him, provided he ſpent the few hours ſtill left in earneſtly imploring it; for the door of heaven's mercy was never ſhut, though that of men might be cruelly ſo. 'This (replied he), this is my conſolation; for thou art God and not man, to be angry for ever. He then inveighed bitterly againſt Auguſtus, and reproached himſelf for having any connection with a wretch who was wholly deſtitute of all faith and honour, an atheiſt, without piety, and without virtue. 'While he was at Warſaw (ſaid he), and heard the king was advancing to attack him, he found himſelf extremely diſtreſſed. He was abſolutely without money, and therefore obliged to diſmiſs ſome of his troops. He had recourſe to my aſſiſtance, and intreated me, for the love of God, to borrow whatever ſum I could. I procured him 400,000 crowns; 50,000 of which, the very next day, he ſquandered on trinkets and jewels, which he gave in preſents to ſome of his women. I told him plainly my thoughts of the matter; and by my importunity prevailed, that the Jews ſhould take back their toys, and return the money they had been paid for them. The ladies were enraged; and he ſwore that I ſhould one time or other ſuffer for what I had done: there indeed he kept his word; would to God he had always done ſo with thoſe he employed." I now left him for a ſhort time, and at ſeven in the evening I returned; and the officer being retired, he accoſted me with a ſmiling air, and an appearance of much tranquillity, 'Welcome, dear ſir, the weight that lay heavy on my heart is removed, and I already feel a ſenſible change wrought in my mind. I am

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ready to die: death is more eligible than the ſolitude of a long impriſonment. Would to heaven only that the kind of it were leſs cruel. Can you, my dear ſir, inform me in what manner I am to ſuffer?" I anſwered, that it had not been communicated to me; but that I imagined it would paſs over without noiſe, as only the colonel and myſelf had notice of it. 'That (replied he) I eſteem as a favour; but have you ſeen the ſentence? or muſt I die, without being either heard or condemned? My apprehenſions are of being put to intolerable tortures.' I comforted him in the kindeſt manner I could; but he was his own beſt comforter from the Word of God, with which he was particularly acquainted; quoting, among many other paſſages, the following in Greek, *We muſt enter into the kingdom of heaven through many tribulations.* He then called for pen and ink, and intreated me to write down what he ſhould dictate. I did ſo, as follows:

'*Teſtamentum, or my laſt will as to the diſpoſition of my effects after my death.*—I. His majeſty King Auguſtus, having firſt examined his conſcience thoroughly, will be ſo juſt as to pay back to my relations the ſum he owes me; which, being liquidated, will amount to 50,000 crowns; and as my relations are here in the ſervice of Sweden, that monarch will probably obtain it for them.'

"At this he ſaid, let us ſtop here a little; I will quickly return to finiſh this will; but now let us addreſs ourſelves to God by prayer. Prayers being ended, 'Now (cried he) I find myſelf yet better, yet in a quieter frame of mind: Oh! were my death leſs dreadful, with what pleaſure would I expiate my guilt by embracing it!—Yes (cried he, after a pauſe), I have friends in different places, who will weep over my deplorable fate. What will the mother of the king of Pruſſia ſay? What will be the grief of the Counteſs Levolde who attends on her? But what thoughts muſt ariſe in the boſom of *her* to whom my faith is plighted? Unhappy woman! the news of my death will be fatal to her peace of mind. My dear paſtor, may I venture to beg one favour of you?' I aſſured him he might command every ſervice in my power. 'Have the goodneſs then (ſaid he, preſſing my hand), the moment I am no more, to write—Alas! how will you ſet about it? a letter to Madam Einſeidelern, the lady I am promiſed to—Let her know that I die her's; inform her fully of my unhappy fate: Send her my laſt and eternal farewell! My death is in truth diſgraceful; but my manner of meeting it will, I hope by heaven's and your aſſiſtance, render it holy and bleſſed. This news will be her only conſolation. Add farther, dear Sir, that I thanked her with my lateſt breath for the ſincere affection ſhe bore me: May ſhe live long and happy: This is my dying wiſh.'—I gave him my hand in promiſe that I would faithfully perform all he deſired.

"Afterwards he took up a book: 'This (ſaid he) is of my own writing. Keep it in remembrance of me, and as a proof of my true regard for religion. I could wiſh it might have the good fortune to be preſented to the king, that he may be convinced with what little foundation I have been accuſed of atheiſm.' Taking it from his hand, I aſſured him that my colonel would not fail to preſent it as ſoon as opportunity offered.

"The reſt of his time was employed in prayer, which he went through with a very fervent devotion. On the 30th of September I was again with him at four in the morning. The moment he heard me he aroſe, and rendering thanks to God, aſſured me he had not ſlept ſo ſoundly for a long time. We went to prayers; and in truth his piety and devout frame of mind were worthy of admiration. About ſix he ſaid he would begin his confeſſion, before the din and clamour of the people without could riſe to diſturb his thoughts. He then kneeled down, and went through his confeſſion in a manner truly edifying. The ſun beginning to appear above the horizon, he looked out of the window, ſaying, *Salve feſta dies!* 'This is my wedding-day. I looked, alas! for another, but this is the happier; for to-day ſhall my ſoul be introduced by her heavenly bridegroom into the aſſembly of the bleſſed!' He then aſked me, whether I yet knew in what way he was to die? I anſwered, that I did not. He conjured me, by the ſacred name of Jeſus, not to forſake him; for that he ſhould find in my company ſome conſolation even in the midſt of tortures. Caſting his eye on the paper that lay on the table, 'This will (ſaid he) can never be finiſhed.' I aſked him, whether he would put his name to what was already written? 'No (replied he, with a deep ſigh), I will write that hated name no more. My relations will find their account in another place; ſalute them for me.' He then addreſſed himſelf again to God in prayer, and continued his devotions till the lieutenant entered to conduct him to the coach. He wrapped himſelf up in his cloak, and went forward a great pace, guarded by 100 horſemen. Being arrived at the place of execution, we found it ſurrounded by 300 foot ſoldiers; but at the ſight of the ſtakes and wheels, his horror is not to be deſcribed. Claſping me in his arms, 'Beg of God (he exclaimed) that my ſoul may not be thrown into deſpair amidſt theſe tortures! I comforted, I adjured him to fix his thoughts on the death of Jeſus Chriſt, who for our ſins was nailed to a croſs.

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"Being now on the ſpot where he was to ſuffer, he bid the executioner to do his duty well, and put into his hands ſome money which he got ready for that purpoſe. He then ſtretched himſelf out upon the wheel; and while they were ſtripping him naked, he begged me to pray that God would have mercy on him, and bear up his ſoul in agony. I did ſo; and turning to all the ſpectators, ſaid to them, Brethren, join with me in prayer for this unhappy man. 'Yes (cried he), aſſiſt me all of you with your ſupplications to heaven.' Here the executioner gave him the firſt ſtroke. His cries were terrible: 'O Jeſus! Jeſus! have mercy upon me.' This cruel ſcene was much lengthened out, and of the utmoſt horror; for as the headſman had no ſkill in his buſineſs, the unhappy victim received upwards of 15 ſeveral blows, with each of which were intermixed the moſt piteous groans and invocations of the name of God. At length, after two ſtrokes given on the breaſt, his ſtrength and voice failed him. In a faltering dying tone, he was juſt heard to ſay, 'Cut off my head?' and the executioner ſtill lingering, he himſelf placed his head on the ſcaffold: After four ſtrokes with an hatchet, the head was ſeparated from the body, and the body quartered. Such was the end of the renowned Patkul."

Charles XII. has been very generally and ſeverely cenſured for not pardoning him, and we are not inclined to vindicate the ſovereign. Yet it muſt be remembered, that Patkul was guilty of a much greater crime than that which drew upon him the diſpleaſure of Charles

XI. He incited foreign powers to attack his country when under the government of a boy, hoping, as he ſaid himſelf, that it would in ſuch circumſtances become an eaſy conqueſt. He was therefore a rebel of the worſt kind; and where is the abſolute monarch that is ready to pardon ſuch unnatural rebellion? Let it be remembered, too, that Charles, among whoſe faults no other inſtance of cruelty has been numbered, certainly thought that, in ordering the execution of Patkul, he was diſcharging his duty. That monarch, it is known, believed in the poſſibility of diſcovering the philoſopher's ſtone. Patkul, when under ſentence of death, contrived to impoſe ſo far upon the ſenate at Stockholm, as to perſuade them that he had, in their preſence, converted into gold a quantity of baſer metal. An account of this experiment was tranſmitted to the king, accompanied with a petition to his majeſty for the life of ſo valuable a ſubject; but Charles, blending magnanimity with his ſeverity, replied with indignation, that he would not grant to intereſt what he had refuſed to the call of humanity and the intreaties of friendſhip.

PATMOS, in *Ancient Geography*, one of the Sporades (Dionyſius); 30 miles in compaſs (Pliny); concerning which we read very little in authors. It was rendered famous by the exile of St John, and the Revelation ſhowed him there. The greateſt part of interpreters think that St John wrote them in the ſame place during the two years of his exile; but others think that he did not commit them to writing till after his return to Epheſus. The iſland of Patmos is between the iſland of Icaria and the promontory of Miletus. Nothing has done it more honour than to have been the place of the baniſhment of St John. It is now called *Patino*, or *Pactino*, or *Patmol*, or *Palmoſa*. Its circuit is five and twenty or thirty miles. It has a city called *Patmos*, with a harbour, and ſome monaſteries of Greek monks. It is at preſent in the hands of the Turks. It is conſiderable for its harbours; but the inhabitants derive little benefit from them, becauſe the corſairs have obliged them to quit the town, and retire to a hill on which St John's convent ſtands. This convent is a citadel conſiſting of ſeveral irregular towers, and is a ſubſtantial building ſeated on a very ſteep rock. The whole iſland is very barren, and without wood; however, it abounds with partridges, rabbits, quails, turtles, pigeons, and ſnipes. All their corn does not amount to 1000 barrels in a year. In the whole iſland there are ſcarcely 300 men: but there are above 20 women to one man, who expect that all ſtrangers who land in the iſland ſhould carry ſome of them away. To the memory of St John is an hermitage on the ſide of a mountain, where there is a chapel not above eight paces long and five broad. Over head they ſhow a chink in the rock, through which they pretend that the Holy Ghoſt dictated to St John. E. Long. 26. 84. N. Lat. 37. 24.

PATNA, a town of Aſia, in the dominions of the Great Mogul, to the north of the kingdom of Bengal, where the Engliſh have factories for ſaltpetre, borax, and raw ſilk. It is the capital of the province of Bahar, a dependency of Bengal, in the empire of Indoſtan, ſituated in a pleaſant country, 400 miles eaſt of Agra. It extends ſeven miles in length on the banks of the Ganges, and is about half a mile in breadth.—Mr Rennel gives ſtrong reaſons for ſuppoſing it to be the ancient PALIBOTHRA. The town is large and populous, but the houſes are built at a diſtance from each other. E. Long. 85. 40. N. Lat. 45. 25.

PATOMACK, a large river of Virginia, in North America, which riſes in the Alleghany mountains, ſeparates Virginia from Maryland, and falls into Cheſapeake bay. It is about ſeven miles broad, and is navigable for near 200 miles.

PATONCE, in *Heraldry*, is a croſs, flory at the ends; from which it differs only in this, that the ends inſtead of turning down like a fleur-de-lis, are extended ſomewhat in the pattee form. See FLORY.

PATRÆ, a city of Achaia. This place was viſited by Dr Chandler, who gives the following account of it. "It has been often attacked by enemies, taken, and pillaged. It is a conſiderable town, at a diſtance from the ſea, ſituated on the ſide of a hill, which has its ſummit crowned with a ruinous caſtle. This made a brave defence in 1447 againſt Sultan Morat, and held out until the peace was concluded, which firſt rendered the Morea tributary to the Turks. A dry flat before it was once the port, which has been choked with mud. It has now, as in the time of Strabo, only an indifferent road for veſſels. The houſe of Nicholas Paul, Eſq. the Engliſh conſul, ſtood on part of the wall either of the theatre or the odéum. By a fountain was a fragment of a Latin inſcription. We ſaw alſo a large marble buſt much defaced; and the French conſul ſhowed us a collection of medals. We found nothing remarkable in the citadel. It is a place of ſome trade, and is inhabited by Jews as well as by Turks and Greeks. The latter have ſeveral churches. One is dedicated to St Andrew the apoſtle, who ſuffered martyrdom there, and is of great ſanctity. It had been recently repaired. The ſite by the ſea is ſuppoſed that of the temple of Ceres. By it is a fountain. The air is bad, and the country round about overrun with the low ſhrub called *glycyrrhiza* or liquorice."

Of its ancient ſtate, the ſame author ſpeaks thus: "Patræ aſſiſted the Ætolians when invaded by the Gauls under Brennus; but afterwards was unfortunate, reduced to extreme poverty, and almoſt abandoned. Auguſtus Cæſar reunited the ſcattered citizens, and made it a Roman colony, ſettling a portion of the troops which obtained the victory of Actium, with other inhabitants from the adjacent places. Patræ reflouriſhed and enjoyed dominion over Naupactus, Oeanthé, and ſeveral cities of Achaia. In the time of Pauſanias, Patræ was adorned with temples and porticoes, a theatre, and an odéum which was ſuperior to any in Greece but that of Atticus Herodes at Athens. In the lower part of the city was a temple of Bacchus Æſymnetes, in which was an image preſerved in a cheſt, and conveyed, it was ſaid, from Troy by Eurypylus; who, on opening it, became diſordered in his ſenſes. By the port were temples; and by the ſea, one of Ceres, with a pleaſant grove and a prophetic fountain of unerring veracity in determining the event of any illneſs. After ſupplicating the goddeſs with incenſe, the ſick perſon appeared, dead or living, in a mirror ſuſpended ſo as to touch the ſurface of the water. In the citadel of Patræ was a temple of Diana Laphria, with her ſtatue in the habit of a huntreſs of ivory and gold, given by Auguſtus Cæſar when he laid waſte Calydon and the cities of Ætolia to people Nicopolis. The Patrenſians honoured her with a yearly feſtival, which is deſcribed by Pauſanias who was a ſpectator. They formed a circle round the altar with pieces of green wood, each 16 cubits long, and within heaped dry fuel. The ſolemnity began with a moſt magnificent proceſſion, which was cloſed by the virgin-prieſteſs in a chariot drawn by ſtags. On the following day, the city and private perſons offered at the altar fruits, and birds, and all kinds of victims, wild-boars, ſtags, deer, young wolves, and beaſts full grown; after which the fire was kindled. He relates, that a bear and another animal forced a way through the fence, but were reconducted to the pile. It was not remembered that any wound had ever been received at this ceremony, though the ſpectacle and ſacrifice were as dangerous as ſavage. The number of women at Patræ was double that of the men. They were employed chiefly in a manufacture of flax which grew in Elis, weaving garments, and attire for the head."

PATRANA, or PASTRANA, a town of New Caſtile in Spain, with the title of a duchy. It is ſeated between the rivers Tajo and Tajuna, in W. Long. 2. 45. N. Lat. 40. 26.

PATRAS, an ancient and flouriſhing town of European Turkey, in the Morea, capital of a duchy, with a Greek archbiſhop's ſee. It is pretty large and populous; and the Jews, who are one-third part of the inhabitants, have four ſynagogues. There are ſeveral handſome moſques and Greek churches. The Jews carry on a great trade in ſilk, leather, honey, wax, and cheeſe. There are cypreſs trees of a prodigious height, and excellent pomegranates, citrons, and oranges. It has been ſeveral times taken and retaken, and it is juſt now in the hands of the Turks. It is ſeated in E. Long. 21. 45. N. Lat. 38. 17.

PATRICA, a town of Italy, in the territory of the church, and in the Campagna of Rome, towards the ſea-coaſt, and eight miles eaſt of Oſtia. About a mile from this place is a hill called *Monte de Livano*, which ſome have thought to be the ancient Lavinium founded by Æneas.

PATRES CONSCRIPTI. See CONSCRIPT and SENATOR.

PATRIARCH, PATRIARCHA, one of thoſe firſt fathers who lived towards the beginning of the world, and who became famous by their long lines of deſcendants. Abraham, Iſaac, and Jacob, and his twelve ſons, are the patriarchs of the Old Teſtament; Seth, Enoch, &c. were antediluvian patriarchs.

The authority of patriarchal government exiſted in the fathers of families, and their firſt-born after them exerciſing all kinds of eccleſiaſtical and civil authority in their reſpective houſeholds; and to this government, which laſted till the time of the Iſraelites dwelling in Egypt, ſome have aſcribed an abſolute and deſpotic power, extending even to the puniſhment by death. In proof of this, is produced the curſe pronounced by Noah upon Canaan (Gen. ix. 25.); but it muſt be obſerved, that in this affair Noah ſeems to have acted rather as a prophet than a patriarch. Another inſtance of ſuppoſed deſpotic power is Abraham's turning Hagar and Iſhmael out of his family (Gen. xxi. 9, &c.); but this can hardly be thought to furniſh evidence of any ſingular authority veſted in the patriarchs, as ſuch, and peculiar to thoſe ages. The third inſtance brought forward to the ſame purpoſe is that of Jacob's denouncing a curſe upon Simeon and Levi (Gen. xlix. 7.), which is maintained by others to be an inſtance of prophetic inſpiration more than of patriarchal power. The fourth inſtance is that of Judah with regard to Tamar (Gen. xxxviii. 24.); with regard to which it is remarked, that Jacob, the father of Judah, was ſtill living; that Tamar was not one of his own family; and that ſhe had been guilty of adultery, the puniſhment of which was death by burning; and that Judah on this occaſion might ſpeak only as a proſecutor.

On the whole, however, it is difficult to ſay which of theſe opinions is moſt agreeable to truth. Men who believe the origin of civil government, and the obligation to obedience, to ariſe from a ſuppoſed original contract, either real or implied, will be naturally led to weaken the authority of the patriarchs: and thoſe again who eſteem government to be a divine inſtitution, will be as apt to raiſe that authority to the higheſt pitch that either reaſon or ſcripture will permit them. It cannot be denied, that authority exiſted in fathers, and deſcended to their firſt-born, in the firſt ages of the world; and it is neither unnatural nor improbable to imagine, that the idea of hereditary power and hereditary honours was firſt taken from this circumſtance. But whether authority has deſcended through father and ſon in this way to our times, is a circumſtance that cannot in one inſtance be aſſerted, and can be denied in a thouſand. The real ſource of the dignity and of the authority of modern times ſeems to have been, ſkill in the art of war, and ſucceſs in the conduct of conqueſts.

Jewiſh PATRIARCH, a dignity, reſpecting the origin of which there are a variety of opinions. The learned authors of the Univerſal Hiſtory think, that the firſt appearance and inſtitution of thoſe patriarchs happened under Nerva the ſucceſſor of Domitian. It ſeems probable that the patriarchs were of the Aaronic or Levitical race; the tribe of Judah being at that time too much depreſſed, and too obnoxious to the Romans to be able to aſſume any external power. But of whatever tribe they were, their authority came to be very conſiderable. Their principal buſineſs was to inſtruct the people; and for this purpoſe they inſtituted ſchools in ſeveral cities. And having gained great reputation for their extraordinary learning, zeal, and piety, they might, in time, not only bring a great concourſe of other Jews from other parts, as from Egypt and other weſtern provinces of their diſperſion, but likewiſe prove the means of their patriarchal authority's being acknowledged there. From them they ventured at length to levy a kind of tribute, in order to defray the charges of their dignity, and of the officers, (viz. the *Apoſtoli* or *Legati*,) under them, whoſe buſineſs it was to carry their orders and deciſions through the other provinces of their diſperſion, and to ſee them punctually executed by all, that ſome ſhadow of union at leaſt might be kept up among the weſtern Jews. They likewiſe nominated the doctors who were to preſide over their ſchools and academies; and theſe were in proceſs of time ſtyled *chiefs* and *princes*, in order to raiſe the credit of that dignity, or to imply the great regard which their diſciples were to pay to them. Theſe chiefs became at length rivals of the patriarchs; and ſome of them poſſeſſed both dignities at once; an uſurpation which cauſed not only great confuſion amongſt them, but oftentimes very violent and bloody conteſts. However, as the Jewiſh Rabbies have trumped up a much older era for this patriarchal dignity, and have given us a ſucceſſion of them down to the fifth century, in which it was aboliſhed, it will not be amiſs to give our readers the ſubſtance of what they have written of the riſe and progreſs of this order of men; and at the ſame time to ſhow them the abſurdity and falſehood of that pretended ſucceſſion to this imaginary dignity.

According to them, the firſt patriarch was Hillel, ſurnamed the *Babylonian*, becauſe he was ſent for from thence to Jeruſalem about 100 years before the ruin of their capital, or 30 years before the birth of Chriſt, to decide a diſpute about the keeping of Eaſter, which on that year fell out on the Sabbath-day; and it was on account of his wiſe deciſion that he was raiſed to that dignity, which continued in his family till the ſaid fifth century. He was likewiſe looked upon as a ſecond Moſes, becauſe he lived like him 40 years in obſcurity, 40 more in great reputation for learning and ſanctity, and 40 more in poſſeſſion of this patriarchal dignity. They make him little inferior to that lawgiver in other of his excellencies, as well as in the great authority he gained over the whole Jewiſh nation. The wonder will be, how Herod the Great, who was ſo jealous of his own power, could ſuffer a ſtranger to be raiſed to ſuch a height of it, barely for having decided a diſpute which muſt in all likelihood have been adjudged by others long before that time.

However, Hillel was ſucceeded by his ſon Simeon, whom many Chriſtians pretend to have been the venerable old perſon of that name, who received the divine infant in his arms. The Jews give him but a very obſcure patriarchate; though the authors above quoted make him, moreover, chief of the ſanhedrim; and Epiphanius ſays, that the prieſtly tribe hated him ſo much for giving ſo ample a teſtimony to the divine child, that they denied him common burial. But it is hardly credible that St Luke ſhould have ſo careleſsly paſſed over his two-fold dignity, if he had been really poſſeſſed of them, and have given him no higher title than that of a juſt and devout man.

He was ſucceeded by Jochanan, not in right of deſcent, but of his extraordinary merit, which the Rabbies, according to cuſtom, have raiſed to ſo ſurpriſing a height, that, according to them, if the whole heavens were paper, all the trees in the world pens, and all the men writers, they would not ſuffice to pen down all his leſſons. He enjoyed his dignity but two years, according to ſome, or five according to others: and was the perſon who, obſerving the gates of the temple to open of their own accord, cried out, "O temple, temple! why art thou thus moved! We know that thou art to be deſtroyed, ſeeing Zechariah hath foretold it, ſaying, "Open thy gates, O Lebanus, and let the flames conſume thy cedars." Upon this he is further reported to have complimented Veſpaſian, or rather, as ſome have corrected the ſtory, Titus, with the title of *king*, aſſuring him that it was a royal perſon who was to deſtroy that edifice; on which account they pretend that general gave him leave to remove the ſanhedrim to Japhne.

The Jewiſh writers add, that he likewiſe erected an academy there, which ſubſiſted till the death of Akiba; and was likewiſe the ſeat of the patriarch; and conſiſted of 300 ſchools, or claſſes of ſcholars. Another he erected at Lydda, not far from Japhne, and where the Chriſtians have buried their famed St George. He lived 120 years, and being aſked, what he had done to prolong his life? he gave this wiſe anſwer; I never made water nearer a houſe of prayer than four cubits; I never diſguiſed my name: I have taken care to celebrate all feſtivals: and my mother hath even ſold my head ornaments to buy wine enough to make me merry on ſuch days; and left me at her death 300 hogſheads of it, to ſanctify the Sabbath.—The doctors who flouriſhed in his time were no leſs conſiderable, both for their number and character; particularly the famed Rabbi Chanina, of whom the Bath Col was heard to ſay, that the world was preſerved for the ſake of him; and R. Nicodemus, whom they pretend to have ſtopped the courſe of the ſun, like another Joſhua.

He was ſucceeded by Gamaliel, a man, according to them, of unſufferable pride; and yet of ſo univerſal authority over all the Jews, not only in the weſt, but over the whole world, that the very monarchs ſuffered his laws to be obeyed in their dominions, not one of them offering to obſtruct the execution of them. In his days flouriſhed Samuel the Leſs, who compoſed a prayer full of the bittereſt curſes againſt heretics, by which they mean the Chriſtians; and which are ſtill in uſe to this day. Gamaliel was no leſs an enemy to them; and yet both have been challenged, the former as the celebrated maſter of our great apoſtle, the other as his diſciple in his unconverted ſtate.

Simon II. his ſon and ſucceſſor, was the firſt martyr who died during the ſiege of Jeruſalem. The people ſo regretted his death, that an order was given, inſtead of 10 bumpers of wine, which were uſually drank at the funeral of a ſaint, to drink 13 at his, on account of his martyrdom. Theſe bumpers were in time multiplied, they tell us, to ſuch ſhameful height, that the ſanhedrim was forced to make ſome new regulations to prevent that abuſe.

Theſe are the patriarchs which, the Rabbies tell us, preceded the deſtruction of the temple; and we need no farther confutation of this pretended dignity, than the ſilence of the ſacred hiſtorians, who not only make not the leaſt mention of it, but aſſure us all along that they were the high-prieſts who preſided in the ſanhedrim; and before whom all caſes relating to the Jewiſh religion were brought and decided. It was the high-prieſt who examined and condemned our Saviour; that condemned St Stephen; that forbade the apoſtles to preach in Chriſt's name; and who ſat as judge on the great apoſtle at the head of that ſupreme court. The ſame may be urged from Joſephus, who muſt needs have known and mentioned this pretended dignity, if any ſuch there had been; and yet is ſo far from taking the leaſt notice of it, that, like the evangeliſts, he places the pontiffs alone at the head of all the Jewiſh affairs; and names the high-prieſt Ananus as having the care and direction of the war againſt the Romans;—which is an evident proof that there were then no ſuch patriarchs in being.

To all this let us add, that if there had been any ſuch remarkable ſucceſſion, the Talmudiſts would have preſerved it to future ages; whereas, neither they, nor any of the ancient authors of the Jewiſh church, make any mention of it; but only ſome of their doctors, who have written a conſiderable time after them, as of writers to whom little credit can be given in points of this nature; eſpecially as there are ſuch unſurmountable contradictions between them, as no authors either Jewiſh or Chriſtian have, with all their pains, been hitherto able to reconcile.

Their ſucceſſion, according to the generality of thoſe rabbies, ſtands as follows:

1. Hillel the Babylonian. 2. Simeon the ſon of Hillel. 3. Gamaliel the ſon of Simeon. 4. Simeon II. the ſon of Gamaliel. 5. Gamaliel II. the ſon of Simeon II. 6. Simeon III. the ſon of Gamaliel II. 7. Judah the ſon of Simeon III. 8. Gamaliel III. the ſon of Judah. 9. Judah II. the ſon of Gamaliel III. 10. Hillel II. ſon of Judah II. 11. Judah III. ſon of Hillel II. 12. Hillel III. ſon of Judah III. 13. Gamaliel IV. ſon of Hillel III.

According to Gants Tzemach David, who hath reduced them to 10, they are,

1. Hillel the Babylonian. 2. Simeon the ſon of Hillel. 3. Rabb. Gamaliel Rebona. 4. R. Simeon the ſon of Gamaliel. 5. Rabban Gamaliel his ſon. 6. R. Jehudah the prince. 7. Hillel the prince, his ſon. 8. Rabban Gamaliel the Old. 9. Simeon III. 10. R. Judah, Naſſi or prince.

On the whole, it cannot be doubted but that their firſt riſe was in Nerva's time, however much Jewiſh pride may have prompted them to falſify, and to aſſert their origin to have been more ancient than it really was. Nor have the Jews been faithful in giving an account of the authority of theſe men. They have exaggerated their power beyond all bounds, for the purpoſe of repelling the arguments of Chriſtians: for their power was certainly more ſhowy than ſubſtantial. In time, however, they certainly impoſed upon the people; and what power they did poſſeſs (which the Romans only allowed to be in religious matters, or in ſuch as were connected with religion) they exerciſed with great rigour. Their pecuniary demands, in particular, became very exorbitant; and was the cauſe of their ſuppreſſion in the year 429.

PATRIARCHS, among Chriſtians, are eccleſiaſtical dignitaries, or biſhops, ſo called from their paternal authority in the church. The power of patriarchs was not the ſame in all, but differed according to the different cuſtoms of countries, or the pleaſures of kings and councils. Thus the patriarch of Conſtantinople grew to be a patriarch over the patriarchs of Epheſus and Cæſarea, and was called the *œcumenical and univerſal patriarch;* and the patriarch of Alexandria had ſome prerogatives which no other patriarch but himſelf enjoyed, ſuch as the right of conſecrating and approving every ſingle biſhop under his juriſdiction.

The patriarchate has been ever eſteemed the ſupreme dignity in the church: the biſhop had only under him the territory of the city of which he was biſhop; the metropolitan ſuperintended a province, and had for ſuffragans the biſhops of his province; the primate was the chief of what was then called a *dioceſe* (A), and had ſeveral metropolitans under him; and the patriarch had under him ſeveral dioceſes, compoſing one exarchate, and the primates themſelves were under him.

Uſher, Pagi, De Marca, and Morinus, attribute the eſtabliſhment of the grand patriarchates to the apoſtles themſelves; who, in their opinion, according to the deſcription of the world then given by geographers, pitched on the three principal cities in the three parts of the known world; viz. Rome in Europe, Antioch in Aſia, and Alexandria in Africa: and thus formed a trinity of patriarchs. Others maintain that the name patriarch was unknown at the time of the council of Nice; and that for a long time afterwards patriarchs and primates were confounded together, as being all equally chiefs of dioceſes, and equally ſuperior to metropolitans, who were only chiefs of provinces. Hence Socrates gives the title patriarch to all the chiefs of dioceſes, and reckons ten of them. Indeed, it does not appear that the dignity of patriarch was appropriated to the five grand ſees of Rome, Conſtantinople, Alexandria, Antioch, and Jeruſalem, till after the council of Chalcedon in 451; for when the council of Nice regulated the limits and prerogatives of the three patriarchs of Rome, Antioch, and Alexandria, it did not give them the title of patriarchs, though it allowed them the pre-eminence and privileges thereof; thus when the council of Conſtantinople adjudged the ſecond place to the biſhop of Conſtantinople, who till then was only a ſuffragan of Heraclea, it ſaid nothing of the patriarchate. Nor is the term *patriarch* found in the decree of the council of Chalcedon, whereby the fifth place is aſſigned to the biſhop of Jeruſalem; nor did theſe five patriarchs govern all the churches.

There

(A) The word dioceſe was then of very different import from what it bears now. Under the article EPISCOPACY, it was obſerved, that the firſt founders of churches regulated their extent and the juriſdiction of their biſhops by the diviſions of the Roman empire into civil juriſdictions. One of theſe diviſions was into provinces and dioceſes. A province compriſed the cities of a whole region ſubjected to the authority of one chief magiſtrate, who reſided in the metropolis or chief city of the province. A dioceſe was a ſtill larger diſtrict, comprehending within it ſeveral provinces, ſubject to the controul of a chief magiſtrate, whoſe reſidence was in the metropolis of the dioceſe. The juriſdiction of the biſhops of the Chriſtian church was eſtabliſhed upon this model. The authority of a private biſhop extended only over the city in which he reſided, together with the adjacent villages and ſurrounding tract of country. This diſtrict was called παροικια, though it comprehended many pariſhes in the modern ſenſe of that word. Under Arcadius and Honorius the empire was divided into thirteen dioceſes: 1. The Oriental dioceſe, containing fifteen provinces; 2. The dioceſe of Egypt, ſix provinces; 3. The Aſiatic dioceſe, ten provinces; 4. The Pontic dioceſe, ten provinces; 5. The dioceſe of Thrace, ſix provinces; 6. The dioceſe of Macedonia, ſix provinces; 7. The dioceſe of Decia, five provinces; 8. The Italic dioceſe, ſeventeen provinces; 9. The dioceſe of Illyricum, ſix provinces; 10. The dioceſe of Africa, ſix provinces; 11. The Spaniſh dioceſe, ſeven provinces; 12. The Gallican dioceſe, ſeventeen provinces; 13. The Britannic dioceſe, five provinces. Each of theſe provinces comprehended many παροικιαι, and each παροικια many modern pariſhes. See *Bingham's Origines Sacræ*, Book ix.

There were, beſides many independent chiefs of dioceſes, who far from owning the juriſdiction of the grand patriarchs, called themſelves *patriarchs*; ſuch as that of Aquileia; nor was Carthage ever ſubject to the patriarch of Alexandria. Moſheim * imagines that the biſhops, who enjoyed a certain degree of pre-eminence over the reſt of their order, were diſtinguiſhed by the Jewiſh title of patriarchs in the fourth century. The authority of the patriarchs gradually increaſed, till about the cloſe of the fifth century, all affairs of moment within the compaſs of their patriarchate came before them, either at firſt hand or by appeals from the metropolitans. They conſecrated biſhops; aſſembled yearly in council the clergy of their reſpective diſtricts; pronounced a deciſive judgment in thoſe caſes where accuſations were brought againſt biſhops; and appointed vicars or deputies, clothed with their authority, for the preſervation of order and tranquillity in the remoter provinces. In ſhort, nothing was done without conſulting them; and their decrees were executed with the ſame regularity and reſpect as thoſe of the princes.

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It deſerves to be remarked, however, that the authority of the patriarchs was not acknowledged through all the provinces without exception. Several diſtricts, both in the eaſtern and weſtern empires, were exempted from their juriſdiction. The Latin church had no patriarchs till the ſixth century; and the churches of Gaul, Britain, &c. were never ſubject to the authority of the patriarch of Rome, whoſe authority only extended to the ſuburbicary provinces. There was no primacy, no exarchate nor patriárchate, owned here; but the biſhops, with the metropolitans, governed the church in common. Indeed, after the name patriarch became frequent in the weſt, it was attributed to the biſhops of Bourges and Lyons; but it was only in the firſt ſignification, viz. as heads of dioceſes. Du Cange ſays, that there have been ſome abbots who have borne the title of patriarchs.

PATRIARCHAL CROSS, in *Heraldry*, is that where the ſhaft is twice croſſed; the lower arms being longer than the upper ones.

PATRICIAN, a title given, among the ancient Romans, to the deſcendants of the hundred, or, as ſome will have it, of the two hundred, firſt ſenators choſen by Romulus; and by him called *patres*, "fathers." Romulus eſtabliſhed this order after the example of the Athenians; who were divided into two claſſes, viz. the ευπατριδας *patricios*, and δημοτικους *populares*. Patricians, therefore, were originally the nobility; in oppoſition to the plebeians. They were the only perſons whom Romulus allowed to aſpire to the magiſtracy; and they exerciſed all the functions of the prieſthood till the year of Rome 495. But the cognizance and character of theſe ancient families being almoſt loſt and extinguiſhed by a long courſe of years, and frequent changes in the empire, a new kind of patricians were afterwards ſet on foot, who had no pretenſions from birth, but whoſe title depended entirely on the emperor's favour. This new patriciate, Zozimus tells us, was erected by Conſtantine, who conferred the quality on his counſellors, not becauſe they were deſcended from the ancient fathers of the ſenate, but becauſe they were the fathers of the republic or of the empire. This dignity in time became the higheſt of the empire. Juſtinian calls it *ſummam dignitatem*. In effect, the patricians ſeem to have had the precedence of the *conſulares*, and to have taken place before them in the ſenate; though F. Faber aſſerts the contrary. What confounds the queſtion is, that the two dignities often met in the ſame perſon; becauſe the patriciate was only conferred on thoſe who had gone through the firſt offices of the empire, or had been conſuls. Pope Adrian made Charlemagne take the title of patrician before he aſſumed the quality of emperor; and other popes have given the title to other kings and princes by reaſon of its eminence.

PATRICIAN is alſo a title of honour often conferred on men of the firſt quality in the time of our Anglo-Saxon kings. See THANE.

PATRICIAN Deities, *Patricii Dii*, in *Mythology*, were Janus, Saturn, the Genius, Pluto, Bacchus, the Sun, the Moon, and the Earth.

PATRICIANS, in eccleſiaſtical writers, were ancient ſectaries, who diſturbed the peace of the church in the beginning of the third century: thus called from their founder *Patricius*, preceptor of a Marcionite called *Symmachus*. His diſtinguiſhing tenet was, that the ſubſtance of the fleſh is not the work of God, but that of the devil: on which account his adherents bore an implacable hatred to their own fleſh; which ſometimes carried them ſo far as to kill themſelves. They were alſo called TATIANITES, and made a branch of the ENCRATITÆ.

PATRICK, ST, the apoſtle of Ireland, and ſecond biſhop of that country. He was born April 5th A. D. 373, of a good family, at Kirk Patrick near Dumbarton, in what is now called Scotland, but then comprehended under the general name of Britain.—His baptiſmal name *Suceath*, ſignifies, in the Britiſh language, "valiant in war." On ſome inroad of certain exiles from Ireland he was taken priſoner, and carried into that kingdom, where he continued ſix years in the ſervice of Milcho, who had bought him of three others, when Patrick acquired the new name of *Cothraig*, or *Ceathar-Tigh*, i. e. *four families*. In this time he made himſelf maſter of the Iriſh language, and at laſt made his eſcape, and returned home on board a ſhip. About two years after, he formed a deſign of converting the Iriſh, either in conſequence of a dream, or of reflection on what he had obſerved during his acquaintance with them. The better to qualify himſelf for this undertaking, he travelled to the continent, where he continued 35 years, purſuing his ſtudies under the direction of his mother's uncle St Martin, biſhop of Tours, who had ordained him deacon; and after his death, with St German, biſhop of Auxerre, who ordained him prieſt, and gave him his third name *Mawen* or *Maginim*.

An ancient author, Henricus Antiſioderenſis, who wrote a book concerning the miracles of St German, conſiders it as the higheſt honour of that prelate to have been the inſtructor of St Patrick: "As the glory of a father ſhines in the government of his ſons; out of the many diſciples in religion who are reported to have been his ſons in Chriſt, ſuffice it briefly to mention one by far the moſt famous, as the ſeries of his actions ſhows, Patrick the particular apoſtle of Ireland, who being under his holy diſcipline 18 years, derived no little knowledge in the inſpired writings from ſuch a ſource. The moſt godly divine pontiff, conſidering him alike diſtinguiſhed in religion, eminent for virtue, and ſtedfaſt in doctrine; and thinking it abſurd to let one of the beſt labourers remain inactive in the Lord's vineyard, recommended him to Celeſtine, pope of Rome, by his preſbyter Segetius, who was to carry to the apoſtolic ſee a teſtimonial of eccleſiaſtical merit of this excellent man. Approved by his judgement, ſupported by his authority, and confirmed by his bleſſing, he ſet out for Ireland; and being peculiarly deſtined to that people as their apoſtle, inſtructed them at that time by his doctrine and miracles; and now does and will forever diſplay the wonderful power of his apoſtleſhip." Laſtly, Pope Celeſtine conſecrated him biſhop, and gave him his moſt familiar name *Patricius*, expreſſive of his honourable deſcent; and to give luſtre and weight to the commiſſion which he now charged him with to convert the Iriſh. Palladius had been here a year before him on the ſame deſign, but with little ſucceſs: the ſaints Kieran, Ailbe, Declan, and Ibar, were precurſors both to Palladius and Patrick. But the great office of apoſtle of Ireland was reſerved for our prelate, who landed in the country of the Evolein, or at Wicklow, A. D. 441. His firſt convert was Sinell, eighth in deſcent from Cormac king of Leinſter; but not meeting with encouragement, he proceeded to Dublin, and thence to Ulſter, where he founded a church (afterwards the famous abbey of Saul, in the county of Down), remarkable for its poſition, being made out of a barn, and its greateſt length reaching from north to ſouth. After labouring ſeven years indefatigably in his great work, he returned to Britain, which he delivered from the hereſies of Pelagius and Arius; engaged ſeveral eminent perſons to aſſiſt him; viſited the iſle of Man, which he converted in 440, when the biſhopric was founded; and, A. D. 448, returned to the ſee of Armagh (A), which he had founded three years before; and in 13 years more completed the converſion of the whole iſland (B). After giving an account of his commiſſion at Rome, he once more returned hither, and ſpent the remainder of his life between the monaſteries of Armagh and Saul, ſuperintending and enforcing the great plan of doctrine and diſcipline which he had eſtabliſhed. After having eſtabliſhed ſchools, or an academy here, he cloſed his life and miniſtry at Saul abbey, in the 120th year of his age, March 17. A. D. 493, and was buried at Down afterwards, in the ſame grave with St Bridget and St Columb, in the ſame place. Reſpecting his burial-place, however, there have been great diſputes; and it has been as great a ſubject of debate with the religious, as Homer's birthplace was formerly among the cities of Greece. Thoſe of Down lay claim to it, on the authority of the following verſes:

> Theſe three in Down lie in tomb one,
> Briget, Patricius, and Columba pious.

Thoſe of Glaſtenbury in England, from the old monuments of their church: And ſome Scots affirm him to have been both born and buried among them at Glaſgow. His genuine works were collected and printed by Sir James Ware, 1656. His immediate ſucceſſor in this ſee was St Binen or Begnus.

Order of St PATRICK, an inſtitution which took place in Ireland in the year 1783. On the fifth of February, in that year, the king ordered letters-patent to be paſſed under the great ſeal of the kingdom of Ireland, for creating a ſociety or brotherhood, to be called *knights of the illuſtrious order of St Patrick*, of which his majeſty, his heirs, and ſucceſſors, ſhall perpetually be ſovereigns, and his majeſty's lieutenant-general and general-governor of Ireland, &c. for the time being, ſhall officiate as grand-maſters; and alſo for appointing Prince Edward, and ſeveral of the prime nobility of Ireland, knights companions of the ſaid illuſtrious order.

PATRICK, *Simon*, a very learned Engliſh biſhop, was born at Gainſborough in Lincolnſhire in 1626. In 1644 he was admitted into Queen's college, Cambridge, and entered into holy orders. After being for ſome time chaplain to Sir Walter St John, and vicar of the church at Batterſea in Surrey, he was preferred to the rectory of St Paul's, Covent-garden, in London, where he continued all the time of the plague in 1665 among his pariſhioners, to their great comfort. In 1668 he publiſhed his Friendly Debate between a Conformiſt and a Nonconformiſt. This was anſwered by the Diſſenters, whom he had much exaſperated by it; but by his moderation and candour toward them afterwards, they were perfectly reconciled to him, and he brought over many of them to the communion of the eſtabliſhed church. In 1678 he was made dean of Peterborough, where he was much beloved. In 1682, Dr Lewis de Moulin, who had been a hiſtory-profeſſor at Oxford, and written many bitter books againſt the church of England, ſent for Dr Patrick upon his ſick bed, and made a ſolemn declaration of his regret on that account, which he ſigned, and it was publiſhed after his death. During the reign of King James, the dean's behaviour ſhowed that he had nothing more at heart than the Proteſtant religion; for which he ventured all that was dear to him, by preaching and writing

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(A) At Armagh St Patrick founded, A. D. 445 or 447, a priory of Auguſtine canons, dedicated to St Peter and St Paul, much enriched by the archbiſhops; reſtored by Imar O Hedegan in the 12th century. It was granted, A. D. 1611, to Sir Toby Caulfield, knight. St Patrick alſo founded there a houſe of canoneſſes of the ſame order, under his ſiſter Lupita, called *Templeua firta*, or the "houſe of miracles."

We are told, that Armagh was made a metropolitan ſee in honour of St Patrick; in conſequence of which it was held in the higheſt veneration not only by biſhops and prieſts, but alſo by kings and biſhops, as the venerable Bede informs us.

(B) There is a cave in the county of Donegal or Tir-connel, near the ſource of the Liffey, which, it is pretended, was dug by Ulyſſes, in order to hold converſations with infernals. The preſent inhabitants call it *Ellan n' Fradatory*, or the "iſland of Purgatory, and Patrick's Purgatory." They affirm, with a pious credulity, that St Patrick the apoſtle of Ireland, or ſome abbot of that name, obtained of God by his earneſt prayers, that the pains and torments which await the wicked after this life might be here ſet forth to view, in order the more eaſily to recover the Iriſh from their ſinful ſtate and heatheniſh errors.

writing againſt the errors of the church of Rome. In 1687 he publiſhed a prayer compoſed for that difficult time, when perſecution was expected by all who ſtood firm to their religion. The year after the Revolution, the dean was appointed biſhop of Chicheſter, and was employed with others of the new biſhops to ſettle the affairs of the church in Ireland. In 1691 he was tranſlated to the ſee of Ely, in the room of the deprived Biſhop Turner. He died in 1707, after having publiſhed various works; among which the moſt diſtinguiſhed are his Paraphraſes and Commentaries on the Holy Scriptures, three volumes folio. Theſe, with Lowth on the Proverbs, Arnold on the Apocrypha, and Whitby on the New Teſtament, make a regular continued commentary in Engliſh on all the ſacred books.

PATRIMONY, a right or eſtate inherited by a perſon from his anceſtors.

The term *patrimony* has been alſo given to church-eſtates or revenues; in which ſenſe authors ſtill ſay, the patrimony of the church of Rimini, Milan, &c. The church of Rome hath patrimonies in France, Africa, Sicily, and many other countries. To create the greater reſpect to the eſtates belonging to the church, it was uſual to give their patrimonies the names of the ſaints they held in the higheſt veneration: thus the eſtate of the church of Ravenna was called the *patrimony of St Apollinarius;* that of Milan, the *patrimony of St Ambroſe;* and the eſtates of the Roman church were called the *patrimony of St Peter in Abruzzo*, the *patrimony of St Peter in Sicily*, and the like.

What is now called *St Peter's patrimony* is only the duchy of Caſtro, and the territory of Orvietto. See Castro, &c.

PATRIOTISM, a love of one's country, which is one of the nobleſt paſſions that can warm and animate the human breaſt. It includes all the limited and particular affections to our parents, children, friends, neighbours, fellow-citizens, and countrymen. It ought to direct and limit their more confined and partial actions within their proper and natural bounds, and never let them encroach on thoſe ſacred and firſt regards we owe to the great public to which we belong. Were we ſolitary creatures, detached from the reſt of mankind, and without any capacity of comprehending a public intereſt, or without affections leading us to deſire and purſue it, it would not be our duty to mind it, nor criminal to neglect it. But as we are parts of the public ſyſtem, and are not only capable of taking in large views of its intereſts, but by the ſtrongeſt affections connected with it, and prompted to take a ſhare of its concerns, we are under the moſt ſacred ties to proſecute its ſecurity and welfare with the utmoſt ardour, eſpecially in times of public trial.

"Zeal for the public good (ſays Mr Addiſon) is the characteriſtic of a man of honour and a gentleman, and muſt take place of pleaſures, profits, and all other private gratifications: that whoſoever wants this motive, is an open enemy, or an inglorious neuter to mankind, in proportion to the miſapplied advantages with which nature and fortune have bleſſed him." This love of our country does not import an attachment to any particular ſoil, climate, or ſpot of earth, where perhaps we firſt drew our breath, though thoſe natural ideas are often aſſociated with the moral ones; and, like external ſigns or ſymbols, help to aſcertain and bind them; but it imports an affection to that moral ſyſtem or community, which is governed by the ſame laws and magiſtrates, and whoſe ſeveral parts are variouſly connected one with the other, and all united upon the bottom of a common intereſt. Wherever this love of our country prevails in its genuine vigour and extent, it ſwallows up all ſordid and ſelfiſh regards; it conquers the love of eaſe, power, pleaſure, and wealth; nay, when the amiable partialities of friendſhip, gratitude, private affection, or regards to a family, come in competition with it, it will teach us to ſacrifice all, in order to maintain the rights, and promote and defend the honour and happineſs of our country. To purſue therefore our private intereſts in ſubordination to the good of our country; to be examples in it of virtue, and obedient to the laws; to chooſe ſuch repreſentatives as we apprehend to be the beſt friends to its conſtitution and liberties; and if we have the power, to promote ſuch laws as may improve and perfect it; readily to embrace every opportunity for advancing its proſperity; cheerfully to contribute to its defence and ſupport; and, if need be, to die for it:—theſe are among the duties which every man, who has the happineſs to be a member of our free and Proteſtant conſtitution, owes to his country.

The conſtitution of man is ſuch, that the moſt ſelfiſh paſſions, if kept within their proper bounds, have a tendency to promote the public good. There is no paſſion of more general utility than patriotiſm; but its origin may unqueſtionably be termed *ſelfiſh*. The love of one's relations and friends is the moſt natural expanſion of ſelf-love: this affection connects itſelf too with local circumſtances, and ſometimes cannot eaſily be ſeparated from them. It often varies, as relationſhip or place varies; but acquires new power when the whole community becomes its object. It was therefore with ſingular propriety that the poet ſaid, "Self-love and ſocial are the ſame." Under the article Calais we have already given the outlines of the tranſactions of its ſiege by Edward III. during which the inhabitants diſplayed a degree of *patriotiſm* truly wonderful. Hiſtory ſcarcely affords a more diſtinguiſhed inſtance of true patriotic virtue than on this occaſion. We ſhall therefore give a fuller account of this remarkable affair, as one of the beſt examples that can poſſibly be ſelected of the virtue we have been explaining. The inhabitants, under Count Vienne their gallant governor, made an admirable defence againſt a well diſciplined and powerful army. Day after day the Engliſh effected many a breach, which they repeatedly expected to ſtorm by morning; but, when morning appeared, they wondered to behold new ramparts raiſed nightly, erected out of the ruins which the day had made. France had now put the ſickle into her ſecond harveſt ſince Edward with his victorious army ſat down before the town. The eyes of all Europe were intent on the iſſue. The Engliſh made their approaches and attacks without remiſſion; but the citizens were as obſtinate in repelling all their efforts. At length, famine did more for Edward than arms. After the citizens had devoured the lean carcaſes of their half-ſtarved cattle, they tore up old foundations and rubbiſh in ſearch of vermin: they fed on boiled leather, and the weeds of exhauſted gardens; and a morſel of damaged corn was accounted matter of

Rapin's Hiſt. Eng. Edw. III.

Patriotiſm

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luxury. In this extremity they reſolved to attempt the enemy's camp. They boldly ſallied forth; the Engliſh joined battle; and, after a long and deſperate engagement, Count Vienne was taken priſoner; and the citizens, who ſurvived the ſlaughter, retired within their gates. On the captivity of their governor, the command devolved upon Euſtace Saint Pierre, the mayor of the town, a man of mean birth, but of exalted virtue. Euſtace ſoon found himſelf under the neceſſity of capitulating, and offered to deliver to Edward the city, with all the poſſeſſions and wealth of the inhabitants, provided he permitted them to depart with life and liberty. As Edward had long ſince expected to aſcend the throne of France, he was exaſperated to the laſt degree againſt theſe people, whoſe ſole valour had defeated his warmeſt hopes; he therefore determined to take an exemplary revenge, though he wiſhed to avoid the imputation of cruelty. He anſwered by Sir Walter Mauny, that they all deſerved capital puniſhment, as obſtinate traitors to him, their true and notable ſovereign; that, however, in his wonted clemency, he conſented to pardon the bulk of the plebeians, provided they would deliver up to him ſix of their principal citizens with halters about their necks, as victims of due atonement for that ſpirit of rebellion with which they had inflamed the common people. All the remains of this deſolate city were convened in the great ſquare; and like men arraigned at a tribunal from whence there was no appeal, expected with throbbing hearts the ſentence of their conqueror. When Sir Walter had declared his meſſage, conſternation and pale diſmay was impreſſed on every face: each looked upon death as his own inevitable lot; for how ſhould they deſire to be ſaved at the price propoſed? Whom had they to deliver up, ſave parents, brothers, kindred, or valiant neighbours, who had ſo often expoſed their lives in their defence? To a long and dead ſilence, deep ſighs and groans ſucceeded, till Euſtace Saint Pierre aſcending a little eminence, thus addreſſed the aſſembly: "My friends and fellow-citizens, you ſee the condition to which we are reduced; we muſt either ſubmit to the terms of our cruel and enſnaring conqueror, or yield up our tender infants, our wives, and chaſte daughters, to the bloody and brutal luſts of the violating ſoldiery. We well know what the tyrant intends by his ſpecious offers of mercy. It does not ſatiate his vengeance to make us merely miſerable, he would alſo make us criminal: he would make us contemptible: he will grant us life on no condition, ſave that of our being unworthy of it. Look about you, my friends, and fix your eyes on the perſons whom you wiſh to deliver up as the victims of your own ſafety. Which of theſe would you appoint to the rack, the axe, or the halter? Is there any here who has not watched for you, who has not fought for you, who has not bled for you? Who, through the length of this inveterate ſiege, has not ſuffered fatigues and miſeries a thouſand times worſe than death, that you and yours might ſurvive to days of peace and proſperity? Is it your preſervers, then, whom you would deſtine to deſtruction? You will not, you cannot, do it. Juſtice, honour, humanity, make ſuch a treaſon impoſſible. Where then is our reſource? Is there any expedient left, whereby we may avoid guilt and infamy on one hand, or the deſolation and horrors of a ſacked city on the other? There is, my friends, there is one expedient left; a gracious, an excellent, a god-like expedient! Is there any here to whom virtue is dearer than life! Let him offer himſelf an oblation for the ſafety of his people! he ſhall not fail of a bleſſed approbation from that power, who offered up his only Son for the ſalvation of mankind." He ſpoke—but an univerſal ſilence enſued. Each man looked round for the example of that virtue and magnanimity in others, which all wiſhed to approve in themſelves, though they wanted the reſolution. At length Saint Pierre reſumed: "It had been baſe in me, my fellow-citizens, to promote any matter of damage to others, which I myſelf had not been willing to undergo in my own perſon. But I held it ungenerous to deprive any man of that preference and eſtimation, which might attend a firſt offer on ſo ſignal an occaſion: for I doubt not but there are many here as ready, nay, more zealous for this martyrdom than I can be, however modeſty and the fear of imputed oſtentation may withhold them from being foremoſt in exhibiting their merits. Indeed the ſtation to which the captivity of Count Vienne has unhappily raiſed me, imports a right to be the firſt in giving my life for your ſakes. I give it freely, I give it cheerfully. Who comes next? Your ſon! exclaimed a youth, not yet come to maturity.—Ah, my child! cried St Pierre; I am then twice ſacrificed.—But no—I have rather begotten thee a ſecond time.—Thy years are few, but full, my ſon; the victim of virtue has reached the utmoſt purpoſe and goal of mortality. Who next, my friends? This is the hour of heroes.—Your kinſman, cried John de Aire! Your kinſman, cried James Wiſſant! Your kinſman, cried Peter Wiſſant!—"Ah! (exclaimed Sir Walter Mauny, burſting into tears), why was I not a citizen of Calais?" The ſixth victim was ſtill wanting, but was quickly ſupplied by lot, from numbers who were now emulous of ſo ennobling an example. The keys of the city were then delivered to Sir Walter. He took the ſix priſoners into his cuſtody. He ordered the gates to be opened, and gave charge to his attendants to conduct the remaining citizens with their families through the camp of the Engliſh. Before they departed, however, they deſired permiſſion to take their laſt adieu of their deliverers.—What a parting! what a ſcene! they crowded with their wives and children about St Pierre and his fellow-priſoners. They embraced, they clung around, they fell proſtrate before them. They groaned; they wept aloud; and the joint clamour of their mourning paſſed the gates of the city, and was heard throughout the camp. At length Saint Pierre and his fellow victims appeared under the conduct of Sir Walter and his guard. All the tents of the Engliſh were inſtantly emptied. The ſoldiers poured from all parts, and arranged themſelves on each ſide to behold, to contemplate, to admire this little band of patriots as they paſſed. They murmured their applauſe of that virtue which they could not but revere even in enemies; and they regarded thoſe ropes which they had voluntarily aſſumed about their necks as enſigns of greater dignity than that of the Britiſh Garter. As ſoon as they had reached the royal preſence, "Mauny (ſays the king), are theſe the principal inhabitants of Calais?" "They are (ſays Mauny); they are not only the principal men of Calais, they are the principal men of France, my lord, if riotiſm.

if virtue has any ſhare in the act of ennobling." "Were they delivered peaceably, (ſays Edward)? Was there no reſiſtance, no commotion among the people?" "Not in the leaſt, my lord. They are ſelf-delivered, ſelf-devoted, and come to offer up their ineſtimable heads as an ample equivalent for the ranſom of thouſands."

The king, who was highly incenſed at the length and difficulty of the ſiege, ordered them to be carried away to immediate execution; nor could all the remonſtrances and intreaties of his courtiers divert him from his cruel purpoſe. But what neither a regard to his own intereſt and honour, what neither the dictates of juſtice, nor the feelings of humanity, could effect, was happily accompliſhed by the more powerful influence of conjugal affection. The queen, who was then big with child, being informed of the particulars reſpecting the ſix victims, flew into her huſband's preſence, threw herſelf on her knees before him, and, with tears in her eyes, beſought him not to ſtain his character with an indelible mark of infamy, by committing ſuch a horrid and barbarous deed. Edward could refuſe nothing to a wife whom he ſo tenderly loved, and eſpecially in her condition; and the queen, not ſatisfied with having ſaved the lives of the ſix burghers, conducted them to her tent, where ſhe applauded their virtue, regaled them with a plentiful repaſt, and having made them a preſent of money and clothes, ſent them back to their fellow-citizens.

The love of their country, and of the public good, ſeems to have been the predominant paſſion of the Spartans. Pedaretus having miſſed the honour of being choſen one of the three hundred who had a certain rank of diſtinction in the city, went home extremely pleaſed and ſatisfied; ſaying, "He was overjoyed there were three hundred men in Sparta more honourable than himſelf."

arch's of Ly- gus.

The patriotiſm of the Romans is well known, and has been juſtly admired. We ſhall content ourſelves at preſent with the following example; a zeal and patriotic devotion ſimilar to which is perhaps ſcarcely equalled, and certainly is not exceeded, in hiſtory.

v, lib. p. 570. *Rol- Rom.* v. i. p.

Rome, under the conſuls Cæſo Fabius and T. Virginius, had ſeveral wars to ſuſtain, leſs dangerous than troubleſome, againſt the Æqui, Volſci, and Veientes. To put a ſtop to the incurſions of the laſt, it would have been neceſſary to have eſtabliſhed a good garriſon upon their frontiers to keep them in awe. But the commonwealth, exhauſted of money, and menaced by abundance of other enemies, was not in a condition to provide for ſo many different cares and expences. The family of the Fabii ſhowed a generoſity and love of their country that has been the admiration of all ages. They applied to the ſenate, and by the mouth of the conſul demanded as a favour that they would be pleaſed to transfer the care and expences of the garriſon neceſſary to oppoſe the enterpriſes of the Veientes to their houſe, which required an aſſiduous rather than a numerous body, promiſing to ſupport with dignity the honour of the Roman name in that poſt. Every body was charmed with ſo noble and unheard of an offer; and it was accepted with great acknowledgment. The news ſpread over the whole city, and nothing was talked of but the Fabii. Every body praiſed, every body admired and extolled them to the ſkies. "If there were two more ſuch families in Rome," ſaid they, "the one might take upon them the war againſt the Volſci, and the other againſt the Æqui, whilſt the commonwealth remained quiet, and the forces of particulars ſubdued the neighbouring ſtates."

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Early the next day the Fabii ſet out, with the conſul at their head, robed, and with his inſignia. Never was there ſo ſmall, and at the ſame time ſo illuſtrious, an army ſeen; for which we have the authority of Livy. Three hundred and ſix ſoldiers, all patricians, and of the ſame family, of whom not one but might be judged worthy of commanding an army, march againſt the Veii full of courage and alacrity, under a captain of their own name, Fabius. They were followed by a body of their friends and clients, animated by the ſame ſpirit and zeal, and actuated only by great and noble views. The whole city flocked to ſee ſo fine a ſight; praiſed thoſe generous ſoldiers in the higheſt terms; and promiſed them conſulſhips, triumphs, and the moſt glorious rewards. As they paſſed before the capitol and the other temples, every body implored the gods to take them into their protection; to favour their departure and undertaking, and to afford them a ſpeedy and happy return. But thoſe prayers were not heard. When they arrived near the river Crimera, which is not far from Veii, they built a fort upon a very rough and ſteep mountain for the ſecurity of the troops, which they ſurrounded with a double foſſe, and flanked with ſeveral towers. This ſettlement, which prevented the enemy from cultivating their ground, and ruined their commerce with ſtrangers, incommoded them extremely. The Veientes not finding themſelves ſtrong enough to ruin the fort which the Romans had erected, applied to the Hetrurians, who ſent them very conſiderable aid. In the mean time the Fabii, encouraged by the great ſucceſs of their incurſions into the enemy's country, made farther progreſs every day. Their exceſſive boldneſs made the Hetrurians conceive thoughts of laying ambuſcades for them in ſeveral places. During the night they ſeized all the eminences that commanded the plain, and found means to conceal a great number of troops upon them. The next day they diſperſed more cattle about the country than they had done before. The Fabii being apprized that the plains were covered with flocks and herds, and defended by only a very ſmall number of troops, they quitted their fort, leaving in it only a ſufficient number to guard it. The hopes of a great booty quickened their march. They arrived at the place in order of battle; and were preparing to attack the advanced guard of the enemy, when the latter, who had their orders, fled without ſtaying till they were charged. The Fabii, believing themſelves ſecure, ſeized the ſhepherds, and were preparing to drive away the cattle. The Hetrurians then quitted their ſkulking places, and fell upon the Romans from all ſides, who were moſt of them diſperſed in purſuit of their prey. All they could do was to rally immediately; and that they could not effect without great difficulty. They ſoon ſaw themſelves ſurrounded on all ſides, and fought like lions, ſelling their lives very dear. But finding that they could not ſuſtain this kind of combat long, they drew up in a wedge, and advancing with the utmoſt fury and impetuoſity, opened themſelves a paſſage through the enemy that led to the ſide of the mountain. When they came thither, they halted, and fought with freſh courage, the enemy leaving them no time to reſpire. As they were upon the higher ground, they defended themſelves with advantage, notwithſtanding their ſmall number; and beating down the enemy, who ſpared no pains in the attack, they made a great ſlaughter of them. But the Veientes having gained the top of the mountain by taking a compaſs, fell ſuddenly upon them, and galled them exceedingly from above with a continual ſhower of darts. The Fabii defended themſelves to their laſt breath, and were all killed to a man. The Roman people were highly affected with the loſs of this illuſtrious band of patriots. The day of their defeat was ranked amongſt the unfortunate days, called *nefaſti*, on which the tribunals were ſhut up, and no public affair could be negociated, or at leaſt concluded. The memory of theſe public-ſpirited patricians, who had ſo generouſly ſacrificed their lives and fortunes for the ſervice of the ſtate, could not be too much honoured.

PATRIPASSIANS, PATRIPASSIANI, in church hiſtory, a Chriſtian ſect, who appeared about the latter end of the ſecond century; ſo called, from their aſcribing the paſſion to the Father; for they aſſerted the unity of God in ſuch a manner as to deſtroy all diſtinctions of perſons, and to make the Father and Son preciſely the ſame; in which they were followed by the Sabellians and others. The author and head of the Patripaſſians was Praxeas, a philoſopher of Phrygia in Aſia. Swedenbourg and his followers ſeem to hold the ſame faith.

PATROCLUS, a Grecian chief at the Trojan war. He was the ſon of Menœtius, by Sthenele, whom ſome call *Philomela* or *Polymela*. The murder of Clyſonymus, the ſon of Amphidamas, by accident, in the time of his youth, made him fly from Opus, where his father reigned. He went to the court of Peleus king of Phthia. He was cordially received, and contracted the moſt intimate friendſhip with Achilles the king's ſon. When the Greeks went to the Trojan war, Patroclus went with them at the expreſs deſire of his father, who had viſited the court of Peleus; and he accordingly embarked with ten ſhips from Phthia. He was the conſtant companion of Achilles; lodged in the ſame tent; and, when he refuſed to appear in the field of battle, becauſe he had been offended by Agamemnon, Patroclus imitated his example, and by his abſence was the cauſe of much evil to the Greeks. At laſt, however, Neſtor prevailed upon him to return to the war, and Achilles permitted him to appear in his armour. The bravery of Patroclus, together with the terror which the ſight of the arms of Achilles inſpired, ſoon routed the victorious armies of the Trojans, and obliged them to fly to the city for ſafety. He would have broken down the walls; but Apollo, who intereſted himſelf for the Trojans, oppoſed him; and Hector, at the inſtigation of that god, diſmounted from his chariot to attack him as he attempted to ſtrip one of the Trojans whom he had ſlain. This engagement was obſtinate; but Patroclus was at length overpowered by the valour of Hector, and the interpoſition of Apollo. His arms became the property of the conqueror; and Hector would have ſevered his head from his body had not Ajax and Menelaus prevented it. His body was at laſt recovered, and carried to the Grecian camp, where Achilles received it with the loudeſt lamentations. His funerals were obſerved with the greateſt ſolemnity. Achilles ſacrificed near the burning pile twelve young Trojans, four of his horſes, and two of his dogs; and the whole was concluded by the exhibition of funeral games, in which the conquerors were liberally rewarded by Achilles. The death of Patroclus, as deſcribed by Homer, gave riſe to new events. Achilles forgot his reſentment againſt Agamemnon, and entered the field to avenge the fall of his friend; and his anger was gratified only by the ſlaughter of Hector, who had more powerfully kindled his wrath by appearing at the head of the Trojan armies in the armour which had been taken from the body of Patroclus. The patronymic of Actorides is often applied to Patroclus, becauſe Actor was father to Menœtius.

PATROL, in war, a round or march made by the guards or watch in the night time, to obſerve what paſſes in the ſtreets, and to ſecure the peace and tranquillity of a city or camp. The patrol generally conſiſts of a body of five or ſix men, detached from a body on guard, and commanded by a ſerjeant.

They go every hour of the night, from the beating of the tattoo until the reveille: they are to walk in the ſtreets in garriſons, and all over the camp in the field, to prevent diſorders, or any number of people from aſſembling together: they are to ſee the lights in the ſoldiers barracks put out, and to take up all the ſoldiers they find out of their quarters. Sometimes patrols conſiſt of an officer and 30 or 40 men, as well infantry as cavalry; but then the enemy is generally near at hand, and conſequently the danger the greater.

PATRON, among the Romans, was an appellation given to a maſter who had freed his ſlave. As ſoon as the relation of maſter expired, that of patron began: for the Romans, in giving their ſlaves their freedom, did not deſpoil themſelves of all rights and privileges in them; the law ſtill ſubjected them to conſiderable ſervices and duties towards their patrons, the neglect of which was very ſeverely puniſhed.

Patron was alſo a name which the people of Rome gave to ſome great man, under whoſe protection they uſually put themſelves; paying him all kinds of honour and reſpect, and denominating themſelves his clients; while the patron, on his ſide, granted them his credit and protection. They were therefore mutually attached and mutually obliged to each other; and by this means, in conſequence of reciprocal ties, all thoſe ſeditions, jealouſies, and animoſities, which are ſometimes the effect of a difference of rank, were prudently avoided: for it was the duty of the patron to adviſe his clients in points of law, to manage their ſuits, to take care of them as of his own children, and ſecure their peace and happineſs. The clients were to aſſiſt their patrons with money on ſeveral occaſions; to ranſom them or their children when taken in war; to contribute to the portions of their daughters; and to defray, in part, the charges of their public employments. They were never to accuſe each other, or take contrary ſides; and if either of them was convicted of having violated this law, the crime was equal to that of treaſon, and any one was allowed to kill the offender with impunity. This patronage was a tie as effectual as any conſanguinity or alliance, and had a wonderful effect towards maintaining union and concord among the people for the ſpace of 600 years; during which time we find no diſſenſions or jealouſies between the patrons and their clients, even in the times of the republic, when the populace frequently mutinied againſt thoſe who were moſt powerful in the city.

Patron, in the church of Rome, a ſaint whoſe name a perſon bears, or under whoſe protection he is put, and whom he takes particular care to invoke; or a ſaint in whoſe name a church or order is founded.

Patron, in the canon or common law, is a perſon who, having the advowſon of a parſonage, vicarage, or the like ſpiritual promotion, belonging to his manor, hath on that account the gift and diſpoſition of the benefice, and may preſent to it whenever it becomes vacant. The patron's right of diſpoſing of a benefice originally ariſes either from the patron or his anceſtors, &c. being the founders or builders of the church; from their having given lands for the maintenance thereof; or from the church's being built on their ground; and frequently from all three together.

rkſt. mment.

PATRONAGE, or **Advowson**, a ſort of incorporeal hereditament, conſiſting in the right of preſentation to a church or eccleſiaſtical benefice. Advowſon, *advocatio*, ſignifies *in clientelam recipere*, the taking into protection; and therefore is ſynonymous with patronage, *patronatus*: and he who has the right of advowſon is called the *patron of the church*. For when lords of manors firſt built churches on their own demeſnes, and appointed the tithes of thoſe manors to be paid to the officiating miniſters, which before were given to the clergy in common (from whence aroſe the diviſion of pariſhes), the lord who thus built a church, and endowed it with glebe or land, had of common right a power annexed of nominating ſuch miniſter as he pleaſed (provided he were canonically qualified) to officiate in that church, of which he was the founder, endower, maintainer, or, in one word, the patron.

Advowſons are either advowſons *appendant*, or advowſons *in groſs*. Lords of manors being originally the only founders, and of courſe the only patrons, of churches, the right of patronage or preſentation, ſo long as it continues annexed to the poſſeſſion of the manor, as ſome have done from the foundation of the church to this day, is called an *advowſon appendant*: and it will paſs, or be conveyed, together with the manor, as incident and appendant thereto, by a grant of the manor only, without adding any other words. But where the property of the advowſon has been once ſeparated from the property of the manor by legal conveyance, it is called an *advowſon in groſs*, or at large, and never can be appendant any more; but it is for the future annexed to the perſon of its owner, and not to his manor or lands.

Advowſons are alſo either *preſentative*, *collative*, or *donative*. An advowſon preſentative, is where the patron hath a right of preſentation to the biſhop or ordinary, and moreover to demand of him to inſtitute his clerk if he finds him canonically qualified: and this is the moſt uſual advowſon. An advowſon collative, is where the biſhop and patron are one and the ſame perſon: in which caſe the biſhop cannot preſent to himſelf; but he does, by the one act of collation, or conferring the benefice, the whole that is done in common caſes, by both preſentation and inſtitution. An advowſon donative, is when the king, or any ſubject by his licence, doth found a church or chapel, and ordains that it ſhall be merely in the gift or diſpoſal of the patron; ſubject to his viſitation only, and not to that of the ordinary; and veſted abſolutely in the clerk by the patron's deed of donation, without preſentation, inſtitution, or induction. This is ſaid to have been anciently the only way of conferring eccleſiaſtical benefices in England; the method of inſtitution by the biſhop not being eſtabliſhed more early than the time of Archbiſhop Becket in the reign of Henry II. and therefore, though Pope Alexander III. in a letter to Becket, ſeverely inveighs againſt the *prava conſuetudo*, as he calls it, of inveſtiture conferred by the patron only, this however ſhows what was then the common uſage. Others contend that the claim of the biſhops to inſtitution is as old as the firſt planting of Chriſtianity in this iſland; and in proof of it they allege a letter from the Engliſh nobility to the pope in the reign of Henry the third, recorded by Matthew Paris, which ſpeaks of preſentation to the biſhop as a thing immemorial. The truth ſeems to be, that, where the benefice was to be conferred on a mere layman, he was firſt preſented to the biſhop in order to receive ordination, who was at liberty to examine and refuſe him: but where the clerk was already in orders, the living was uſually veſted in him by the ſole donation of the patron; till about the middle of the 12th century, when the pope and his biſhops endeavoured to introduce a kind of feodal dominion over eccleſiaſtical benefices, and, in conſequence of that, began to claim and exerciſe the right of inſtitution univerſally, as a ſpecies of ſpiritual inveſtiture.

However this may be, if, as the law now ſtands, the true patron once waves this privilege of donation, and preſents to the biſhop, and his clerk is admitted and inſtituted, the advowſon is now become for ever preſentative, and ſhall never be donative any more. For theſe exceptions to general rules and common right are ever looked upon by the law in an unfavourable view, and conſtrued as ſtrictly as poſſible. If therefore the patron, in whom ſuch peculiar right reſides, does once give up that right, the law, which loves uniformity, will interpret it to be done with an intention of giving it up for ever; and will therefore reduce it to the ſtandard of other eccleſiaſtical livings. See further, Law, Part III. Sect. v. N° clix. 5—10.

Arms of Patronage, in *Heraldry*, are thoſe on the top of which are ſome marks of ſubjection and dependence: thus the city of Paris lately bore the fleurs-de-lis in chief, to ſhow her ſubjection to the king; and the cardinals, on the top of their arms, bear thoſe of the pope, who gave them the hat, to ſhow that they are his creatures.

PATRONYMIC, among grammarians, is applied to ſuch names of men or women as are derived from thoſe of parents or anceſtors.

Patronymics are derived, 1. From the father; as Pelides, *i. e.* Achilles the ſon of Peleus. 2. From the mother; as Philyrides, *i. e.* Chiron the ſon of Philyra. 3. From the grandfather on the father's ſide; as Æacides, *i. e.* Achilles the grandſon of Æacus. 4. From the grandfather by the mother's ſide; as Atlantiades, *i. e.* Mercury the grandſon of Atlas. And, 5. From the kings and founders of nations; as Romulidæ, *i. e.* the Romans, from their founder King Romulus.

The termination of Greek and Latin patronymics are chiefly four, viz. *des*, of which we have examples above; *as*, as Thaumantias, *i. e.* Iris the daughter of Thaumas; *is*, as Atlantis, *i. e.* Electra the daughter of Atlas; and *ne*, as Nerine, the daughter of Nereus. Of theſe terminations *des* is maſculine; and *as*, *is*, and *ne*, feminine: *des* and *ne* are of the firſt declenſion, *as* and *is* of the third.

The Ruſſians, in their uſual mode of addreſs, never prefix any title or appellation of reſpect to their names; but perſons of all ranks, even thoſe of the firſt diſtinction, call each other by their Chriſtian names, to which they add a patronymic. Theſe patronymics are formed in ſome caſes by adding Vitch (the ſame as our Fitz, as Fitzherbert, or the ſon of Herbert) to the Chriſtian name of the father; in others by Of or Ef; the former is applied only to perſons of condition, the latter to thoſe of inferior rank. Thus,

Ivan Ivanovitch, Ivan Ivanof, is Ivan the ſon of Ivan: Peter Alexievitch, Peter Alexeof, Peter the ſon of Alexey.

The female patronymic is Efna or Ofna, as Sophia Alexeefna, or Sophia the daughter of Alexey; Maria Ivanofna, or Maria the daughter of Ivan.

Great families are alſo in general diſtinguiſhed by a ſurname, as thoſe of Romanof, Galitzin, Sheremetof, &c.

PATROS, mentioned by Jeremiah and Ezekiel, appears from the context to be meant of a part of Egypt. Bocchart thinks it denotes the Higher Egypt: the Septuagint tranſlate it the country of *Pathure;* in Pliny we have the *Nomos Phaturites* in the Thebais; in Ptolemy, *Pathyris*, probably the metropolis. From the Hebrew appellation *Patros* comes the gentilitious name *Pathruſim*, (Moſes).

PATTANS, PATANS, or AFGHANS, a very warlike race of men, who had been ſubjects of the vaſt empire of Bochara. They revolted under their governor Abſtagi, in the 10th century, and laid the foundation of the empire of Ghizni or Gazna. In the Diſſertation prefixed to vol. iii. of Dow's Hiſtory, we have this account of the Pattans.

"They are divided into diſtinct communities, each of which is governed by a prince, who is conſidered by his ſubjects as the chief of their blood, as well as their ſovereign. They obey him without reluctance, as they derive credit to their family by his greatneſs. They attend him in his wars with the attachment which children have to a parent; and his government, though ſevere, partakes more of the rigid diſcipline of a general than the caprice of a deſpot. Rude, like the face of their country, and fierce and wild as the ſtorms which cover their mountains, they are addicted to incurſions and depredations, and delight in battle and plunder. United firmly to their friends in war, to their enemies faithleſs and cruel, they place juſtice in force, and conceal treachery under the name of addreſs."

The empire, which took its riſe from the revolt of the Pattans, under a ſucceſſion of warlike princes roſe to a ſurpriſing magnitude. In the beginning of the 11th century, it extended from Iſpahan to Bengal, and from the mouths of the Indus to the banks of the Jaxertes, which comprehends at leaſt half of the continent of Aſia. They had fled to the mountains on the borders of Perſia, that they might eſcape the ſword, or avoid ſubmitting to the conquerors of India; and there they formed their ſtate, which the Moguls were never able thoroughly to ſubdue. Indeed they ſometimes exerciſed depredations on the adjacent countries; nor was it poſſible for the Moguls either to prevent it or to extirpate them. They were ſenſible that the climate and ſoil of the delicious plains would only ſerve to rob them of that hardineſs they contracted in the hills to which they were confined; they, therefore, for a long time gave no indications of a deſire to exchange them for more pleaſing abodes, or a more acceſſible ſituation. This enabled them to brave the victorious army of Nadir Shah, whoſe troops they quietly ſuffered to penetrate into Hindoſtan, and waited his return with the ſpoils of that country.—They then haraſſed his army in the ſtraits and defiles of the mountains, and proved themſelves ſuch abſolute maſters of the paſſes, that they forced him to purchaſe from them his paſſage into Perſia.

In the beginning of the 18th century, they had ſpread themſelves over the adjoining province of Kandahar; and ſuch was the imbecility of the Perſian empire at that time, that many other provinces and tributary ſtates were alſo induced to revolt. When the king or ſhah of that time, whoſe name was *Huſſein*, oppoſed the growing power of this warlike people, he was totally defeated, and Iſpahan was beſieged and obliged to ſurrender, after having ſuffered dreadful calamities, to an army conſiſting of only 30,000 men. In conſequence of this, they brought about a revolution in Perſia, and ſubjected it to themſelves. This ſovereignty, however, they only held for ſeven years and 21 days, having fallen a ſacrifice to the enterpriſing ſpirit of Kouli Khan, or Nadir Shah. See PERSIA and AFGHANS.

PAU, a town of France, in the province of Gaſcony and territory of Bearne, having formerly a parliament, a mint, and a caſtle. "The city of Pau (ſays Wraxal*) will be for ever memorable in hiſtory, ſince it was the birthplace of Henry IV. That immortal prince was born in the caſtle, then the uſual reſidence of the kings of Navarre. It ſtands on one of the moſt romantic and ſingular ſpots I have ever ſeen, at the weſt end of the town, upon the brow of a rock which terminates perpendicularly. Below runs the Gave, a river or rather a torrent which riſes in the Pyrenees, and empties itſelf into the Adour. On the other ſide, about two miles off, is a ridge of hills covered with vineyards, which produce the famous *Vin de Jorençon*, ſo much admired; and beyond all, at the diſtance of nine leagues, appear the Pyrenees themſelves, covering the horizon from eaſt to weſt, and bounding the proſpect. The caſtle, though now in a ſtate of decay, is ſtill habitable; and the apartments are hung with tapeſtry, ſaid to be the work of Jane queen of Navarre, and mother of Henry IV. Gaſton IV. count de Foix, who married Leonora heireſs of the crown of Navarre, began the edifice in 1464; but his ſucceſſor Henry d'Albret completed and enlarged it about the year 1519, when he made choice of the city of Pau for his reſidence, and where, during the remainder of his reign, he held his little court. In a chamber, which by its ſize was formerly a room of ſtate, is a fine whole length portrait of that Jane queen of Navarre whom I have juſt mentioned. Her dreſs is very ſplendid, and reſembles thoſe in which our Elizabeth is uſually painted. Her head-dreſs is adorned with pearls; round her neck ſhe wears a ruff; and her arms, which are likewiſe covered with pearls, are concealed by her habit.

* *Tour through France.*

habit quite down to the wriſt. At her waiſt hangs by a chain a miniature portrait. The fingers of her right hand play on the ſtrings of a guitar; and in her left ſhe holds an embroidered handkerchief. The painter has drawn her as young, yet not in the firſt bloom of youth. Her features are regular, her countenance thin, but rather inclining to long; the eyes hazel, and the eyebrows finely arched. Her noſe is well formed though large, and her mouth pretty. She was a great princeſs, of high ſpirit, and undaunted magnanimity. Her memory is not revered by the French hiſtorians, becauſe ſhe was the protectreſs of the Huguenots and the friend of Coligni; but the actions of her life evince her diſtinguiſhed merit.

"In one of the adjoining chambers, is another portrait of Henry IV. himſelf when a boy; and on the ſecond floor is the apartment in which he was born. The particulars of his birth are in themſelves ſo curious, and and as relating to ſo great and good a prince, are ſo peculiarly intereſting, that I doubt not you will forgive my enumerating them, even though you ſhould have ſeen them elſewhere.—His mother Jane had already loſt two ſons, the duke de Beaumont and the count de Marle. Henry d'Albret, her father, anxious to ſee an heir to his dominions, enjoined her (when ſhe accompanied her huſband Anthony of Bourbon to the wars of Picardy againſt the Spaniards), if ſhe proved with child, to return to Pau, and to ly-in there, as he would himſelf ſuperintend the education of the infant from the moment of its birth. He threatened to diſinherit her if ſhe failed to comply with this injunction. The princeſs, in obedience to the king's command, being in the ninth month of her pregnancy, quitted Compiegne in the end of November, traverſed all France in 15 days, and arrived at Pau, where ſhe was delivered of a ſon on the 13th December 1553. She had always been deſirous to ſee her father's will, which he kept in a golden box; and he promiſed to ſhow it to her, provided ſhe admitted of his being preſent at her delivery, and would, during the pains of her labour, ſing a ſong in the Bearnois language. Jane had courage enough to perform this unuſual requeſt; and the king being called on the firſt news of her illneſs, ſhe immediately ſung a Bearnois ſong, beginning, 'Notre Dame du bout du pont, aidez moi en cette heure.'—As ſhe finiſhed it, Henry * was born. The king inſtantly performed his promiſe, by giving her the box, together with a golden chain, which he tied about her neck; and taking the infant into his own apartment, began by making him ſwallow ſome drops of wine, and rubbing his lips with a root of garlic. They ſtill ſhow a tortoiſe-ſhell which ſerved him for a cradle, and is preſerved on that account. Several of the ancient ſovereigns of Navarre reſided and died in the caſtle of Pau. François Phœbus, who aſcended the throne in 1479, died here in 1483."

See *Hen-*
King of
ance.

Pau is a handſome city, well built, and contains near 6000 inhabitants. It is a modern place, having owed its exiſtence entirely to the caſtle, and to the reſidence of the kings of Navarre. W. Long. 0. 4. N. Lat. 43. 15.

PAVAN, or PAVANE, a grave dance uſed among the Spaniards, and borrowed from them; wherein the performers made a kind of wheel or tail before each other, like that of *pavo*, "a peacock;" from whence the name is derived. The pavane was formerly in great repute; and was danced by gentlemen with cap and ſword; by thoſe of the long robe in their gowns, by princes with their mantles, and by the ladies with their gown tails trailing on the ground. It was called the *grand ball*, from the ſolemnity with which it was performed. To moderate its gravity, it was uſual to introduce ſeveral flouriſhes, paſſades, capers, &c. by way of epiſodes. Its tablature or ſcore is given at large by Thoinot Arbeau in his Orcheſographia.

PAVETTA, a genus of plants belonging to the tetrandria claſs; and in the natural method ranking under the 47th order *Stellatæ*. See BOTANY *Index*.

PAVIA, an ancient and celebrated town of Italy, in the duchy of Milan, and capital of the Paveſan, with an univerſity and biſhop's ſee. It was anciently called *Ticinum*, from its ſituation on that river, and lies 20 miles to the ſouthward of Milan. It was formerly the capital of the Longobardic kingdom, and is ſtill remarkable for the broadneſs of its ſtreets, the beauty and richneſs of ſome of its churches, and for its univerſity founded by Charlemagne, and for ſeveral other literary inſtitutions. Here is a biſhop's ſee, which was once the richeſt in Italy, but is now dependent on the pope; and upon the whole the city is gone to decay, its trade being ruined through the exactions of the government. The few objects within it worth the public attention belong to the clergy or monks; and the church and convent of the Carthuſians are inexpreſſibly noble, the court of the convent being one of the fineſt in the world, and ſurrounded by a portico ſupported by pillars, the whole a mile in circumference. It is defended by ſtrong walls, large ditches, good ramparts, excellent baſtions, and a bridge over the river Taſin. In the centre of the town is a ſtrong caſtle, where the duke of Milan was wont to reſide. There are a great number of magnificent caſtles, and ſome colleges. It was taken by the duke of Savoy in 1706; by the French in 1733; by the French and Spaniards in 1745; but retaken by the Auſtrians in 1746. E. Long. 9. 5. N. Lat. 45. 10.

PAVILION, in *Architecture*, ſignifies a kind of turret, or building, uſually inſulated, and contained under a ſingle roof; ſometimes ſquare, and ſometimes in form of a dome: thus called from the reſemblance of its roof to a tent.

Pavilions are ſometimes alſo projecting pieces, in the front of a building, marking the middle thereof; ſometimes the pavilion flanks a corner, in which caſe it is called *an angular pavilion*. The Louvre is flanked with four pavilions: the pavilions are uſually higher than the reſt of the building. There are pavilions built in gardens, commonly called *ſummer-houſes*, *pleaſure-houſes*, &c. Some caſtles or forts conſiſt only of a ſingle pavilion.

PAVILION, in military affairs, ſignifies a tent raiſed on poſts, to lodge under in the ſummer-time.

PAVILION, is alſo ſometimes applied to flags, colours, enſigns, ſtandards, banners, &c.

PAVILION, in *Heraldry*, denotes a covering in form of a tent, which inveſts or wraps up the armories of divers kings and ſovereigns, depending only on God their ſword.

The pavilion conſiſts of two parts; the top, which is the chapeau, or coronet; and the curtain, which makes the mantle.

None but ſovereign monarchs, according to the French heralds, may bear the pavilion entire, and in all its parts. Thoſe who are elective, or have any dependence, ſay the heralds, muſt take off the head, and retain nothing but the curtains.

PAVILIONS, among jeweliers, the underſides and corners of the brilliants, lying between the girdle and the collet.

PAVING, the conſtruction of ground-floors, ſtreets, or highways, in ſuch a manner that they may be conveniently walked upon. In Britain, the pavement of the grand ſtreets, &c. is uſually of flint, or rubble-ſtone; courts, ſtables, kitchens, halls, churches, &c. are paved with tiles, bricks, flags, or fire-ſtone; ſometimes with a kind of freeſtone and ragſtone.

In ſome ſtreets, e. g. of Venice, the pavement is of brick: churches ſometimes are paved with marble, and ſometimes with moſaic work, as the church of St Mark at Venice. In France, the public roads, ſtreets, courts, &c. are all paved with gres or gritt, a kind of freeſtone.

In Amſterdam and the chief cities of Holland, they call their brick pavement the *burgher-maſters pavement*, to diſtinguiſh it from the ſtone or flint pavement, which uſually takes up the middle of the ſtreet, and which ſerves for carriages; the brick which borders it being deſtined for the paſſage of people on foot.

Pavements of freeſtone, flint, and flags, in ſtreets, &c. are laid dry, i. e. in a bed of ſand; thoſe of courts, ſtables, ground-rooms, &c. are laid in a mortar of lime and ſand; or in lime and cement, eſpecially if there be vaults or cellars underneath. Some maſons, after laying a floor dry, eſpecially of brick, ſpread a thin mortar over it; ſweeping it backwards and forwards to fill up the joints. The ſeveral kinds of pavement are as various as the materials of which they are compoſed, and whence they derive the name by which they are diſtinguiſhed; as,

1. *Pebble paving*, which is done with ſtones collected from the ſea-beach, moſtly brought from the iſlands of Guernſey and Jerſey: they are very durable, indeed the moſt ſo of any ſtone uſed for this purpoſe. They are uſed of various ſizes, but thoſe which are from ſix to nine inches deep, are eſteemed the moſt ſerviceable. When they are about three inches deep, they are denominated *bolders* or *bowlers;* theſe are uſed for paving court-yards, and other places not accuſtomed to receive carriages with heavy weights; when laid in geometrical figures, they have a very pleaſing appearance.

2. *Rag-paving* was much uſed in London, but is very inferior to the pebbles; it is dug in the vicinity of Maidſtone in Kent, from which it has the name of *Kentiſh ragſtone;* there are ſquared ſtones of this material for paving coach-tracks and footways.

3. *Purbeck pitchens;* ſquare ſtones uſed in footways; they are brought from the iſland of Purbeck, and alſo frequently uſed in court-yards; they are in general from ſix to ten inches ſquare, and about five inches deep.

4. *Squared paving*, for diſtinction by ſome culled *Scotch paving*, becauſe the firſt of the kind paved in the manner that has been and continues to be paved, came from Scotland; the firſt was a clear cloſe ſtone, called *blue whynn*, which is now diſuſed, becauſe it has been found inferior to others ſince introduced in the order they are hereafter placed.

5. *Granite*, a hard material, brought alſo from Scotland, of a reddiſh colour, very ſuperior to the blue whynn quarry, and at preſent very commonly uſed in London.

6. *Guernſey*, which is the beſt, and very much in uſe; it is the ſame ſtone with the pebble before ſpoken of, but broken with iron hammers, and ſquared to any dimenſions required of a priſmoidical figure, ſet with its ſmalleſt baſe downwards. The whole of the foregoing paving ſhould be bedded and paved in ſmall gravel.

7. *Purbeck paving*, for footways, is in general got in large ſurfaces about two inches and a half thick; the blue ſort is the hardeſt and the beſt of this kind of paving.

8. *Yorkſhire paving*, is an exceeding good material for the ſame purpoſe, and is got of almoſt any dimenſions of the ſame thickneſs as the Purbeck. This ſtone will not admit the wet to paſs through it, nor is it affected by the froſt.

9. *Ryegate* or *fireſtone paving*, is uſed for hearths, ſtoves, ovens, and ſuch places as are liable to great heat, which does not affect the ſtone if kept dry.

10. *Newcaſtle flags*, are ſtones about two feet ſquare, and one inch and a half or two inches thick; they anſwer very well for paving out-offices: they are ſomewhat like the Yorkſhire.

11. *Portland paving*, with ſtone from the iſland of Portland; this is ſometimes ornamented with black marble dots.

12. *Swedland paving*, is a black ſlate dug in Leiceſterſhire, and looks well for paving halls, or in party-coloured paving.

13. *Marble paving*, is moſtly variegated with different marbles, ſometimes inlaid in moſaic.

14. *Flat brick paving*, done with brick laid in ſand, mortar, or groute, as when liquid lime is poured into the joints.

15. *Brick-on-edge paving*, done with brick laid edgewiſe in the ſame manner.

16. Bricks are alſo laid flat or edgewiſe in herring-bone.

17. Bricks are alſo ſometimes ſet endwiſe in ſand, mortar, or groute.

18. Paving is alſo performed with paving bricks.

19. With ten inch tiles.

20. With foot tiles.

21. With clinkers for ſtables and outer offices.

22. With the bones of animals, for gardens, &c.

And, 23. We have knob-paving, with large gravel-ſtones, for porticoes, garden-ſeats, &c.

Pavements of churches, &c. frequently conſiſt of ſtones of ſeveral colours; chiefly black and white, and of ſeveral forms, but chiefly ſquares and lozenges, artfully diſpoſed. Indeed, there needs no great variety of colours to make a ſurpriſing diverſity of figures and arrangements. M. Truchet, in the Memoirs of the French Academy, has ſhown by the rules of combination, that two ſquare ſtones, divided diagonally into two colours, may be joined together chequerwiſe 64 different ways: which appears ſurpriſing enough; ſince two letters or figures can only be combined two ways.

The reaſon is, that letters only change their ſituation with regard to the firſt and ſecond, the top and bottom remaining the ſame; but in the arrangement of theſe ſtones, each admits of four ſeveral ſituations, in each whereof the other ſquare may be changed 16 times, which gives 64 combinations.

Indeed, from a farther examination of theſe 64 combinations, he found there were only 32 different figures, each figure being repeated twice in the ſame ſituation, though in a different combination; ſo that the two only differed from each other by the tranſpoſition of the dark and light parts.

PAUL, formerly named SAUL, was of the tribe of Benjamin, a native of Tarſus in Cilicia, a Phariſee by profeſſion; firſt a perſecutor of the church, and afterwards a diſciple of Jeſus Chriſt, and apoſtle of the Gentiles. It is thought he was born about two years before our Saviour, ſuppoſing that he lived 68 years, as we read in a homily which is in the 6th volume of St Chryſoſtom's works. He was a Roman citizen (Acts xxii. 27, 28.), becauſe Auguſtus had given the freedom of the city to all the freemen of Tarſus, in conſideration of their firm adherence to his intereſts. His parents ſent him early to Jeruſalem, where he ſtudied the law at the feet of Gamaliel a famous doctor (id. xxii. 3.). He made very great progreſs in his ſtudies, and his life was always blameleſs before men; being very zealous for the whole obſervation of the law of Moſes (id. xxvi. 4, 5.). But his zeal carried him too far; he perſecuted the church, and inſulted Jeſus Chriſt in his members (1 Tim. i. 13.); and when the protomartyr St Stephen was ſtoned, Saul was not only conſenting to his death, but he even ſtood by and took care of the clothes of thoſe that ſtoned him (Acts vii. 58, 59.). This happened in the 33d year of the common era, ſome time after our Saviour's death.

At the time of the perſecution that was raiſed againſt the church, after the death of St Stephen, Saul was one of thoſe that ſhowed moſt violence in diſtreſſing the believers (Gal. i. 13. and Acts xxvi. 11.). He entered into their houſes, and drew out by force both men and women, loaded them with chains, and ſent them to priſon (Acts viii. 3. and xxii. 4.). He even entered into the ſynagogues, where he cauſed thoſe to be beaten with rods that believed in Jeſus Chriſt, compelling them to blaſpheme the name of the Lord. And having got credentials from the high-prieſt Caiaphas, and the elders of the Jews, to the chief Jews of Damaſcus, with power to bring to Jeruſalem all the Chriſtians he ſhould find there, he went away full of threats, and breathing nothing but blood (Acts ix. 1, 2, 3, &c.). But as he was upon the road, and now drawing near to Damaſcus, all on a ſudden about noon, he perceived a great light to come from heaven, which encompaſſed him and all thoſe that were with him. This ſplendor threw them on the ground; and Saul heard a voice that ſaid to him, "Saul, Saul, why perſecuteſt thou me?" It was Jeſus Chriſt that ſpoke to him. To whom Saul anſwered, "Who art thou, Lord?" And the Lord replied to him, "I am Jeſus of Nazareth whom thou perſecuteſt; it is hard for thee to kick againſt the pricks." Saul, all in conſternation, aſked, "Lord, what is it that thou wouldſt have me do?" Jeſus bid him ariſe and go to Damaſcus, where the will of the Lord ſhould be revealed to him.

Saul then roſe from the ground, and felt that he was deprived of ſight; but his companions led him by the hand, and brought him to Damaſcus, where he continued three days blind, and without taking any nouriſhment. He lodged at the houſe of a Jew named Judas. On the third day, the Lord commanded a diſciple of his, named Ananias, to go to find out Saul, to lay his hands upon him, and to cure his blindneſs. And as Ananias made excuſes, ſaying that this man was one of the moſt violent perſecutors of the church, the Lord ſaid to him, Go and find him, becauſe this man is an inſtrument that I have choſen, to carry my name before the Gentiles, before kings, and before the children of Iſrael; for I will ſhow him how many things he muſt ſuffer for my name. Ananias went therefore, and found Saul, laid his hand upon him, and reſtored him to his ſight; then riſing, he was baptized, and filled with the Holy Ghoſt. After this he continued ſome days with the diſciples that were at Damaſcus, preaching in the ſynagogues, and proving that Jeſus was the Meſſiah (A).

From Damaſcus he went into Arabia (Gal. i. 17.), probably

(A) The converſion of ſuch a man, at ſuch a time, and by ſuch means, furniſhes one of the moſt complete proofs that have ever been given of the divine origin of our holy religion. That Saul, from being a zealous perſecutor of the diſciples of Chriſt, became all at once a diſciple himſelf, is a fact which cannot be controverted without overturning the credit of all hiſtory. He muſt therefore have been converted in the miraculous manner in which he himſelf ſaid he was, and of courſe the Chriſtian religion be a divine revelation; or he muſt have been either an impoſtor, an enthuſiaſt, or a dupe to the fraud of others. There is not another alternative poſſible.

If he was an impoſtor, who declared what he knew to be falſe, he muſt have been induced to act that part by ſome motive: (See MIRACLE). But the only conceivable motives for religious impoſture are, the hopes of advancing one's temporal intereſt, credit, or power; or the proſpect of gratifying ſome paſſion or appetite under the authority of the new religion. That none of theſe could be St Paul's motive for profeſſing the faith of Chriſt crucified, is plain from the ſtate of Judaiſm and Chriſtianity at the period of his forſaking the former and embracing the latter faith. Thoſe whom he left were the diſpoſers of wealth, of dignity, of power, in Judea: thoſe to whom he went were indigent men, oppreſſed, and kept from all means of improving their fortunes. The certain conſequence therefore of his taking the part of Chriſtianity was the loſs not only of all that he poſſeſſed, but of all hopes of acquiring more; whereas, by continuing to perſecute the Chriſtians, he had hopes riſing almoſt to a certainty of making his fortune by the favour of thoſe who were at the head of the Jewiſh ſtate, to whom nothing could ſo much recommend him as the zeal which he had ſhown in that perſecution. As to credit or reputation, could the ſcholar of Gamaliel hope to gain either by becoming a teacher in a college of fiſhermen? Could he flatter himſelf, that the doctrines which he taught would, either in or out of Judea, do him honour, when he knew that "they were to the Jews a ſtumbling block, and to the Greeks fooliſhneſs?" Was it then the love of power that induced him to make this great change? Power! over whom? over a flock of ſheep whom he himſelf had aſſiſted to deſtroy, probably into the neighbourhood of Damaſcus, being then under the government of Aretas king of Arabia; and having remained there for a little while, he returned to Damaſcus, where he began again to preach the goſpel. The Jews could not bear to ſee the progreſs that the goſpel made here; and ſo reſolved to put him to death: and they gained to their ſide the governor of Damaſcus, who was to apprehend him, and to deliver him to them. Of this Saul had early notice; and knowing that the gates of the city were guarded night and day to prevent him from making his eſcape, he was let down over the wall in a baſket. And coming to Jeruſalem to ſee Peter (Gal. i. 38.), the diſciples were afraid to have any correſpondence with him, not believing him to be a convert. But Barnabas having brought him to the apoſtles, Saul related to them the manner of his converſion, and all that had followed in conſequence of it. Then he began to preach both to the Jews and Gentiles; and ſpoke to them with ſuch ſtrength of argument, that not being able to withſtand him in reaſoning, they reſolved to kill him. For this reaſon, the brethren brought him to Cæſarea of Paleſtine, from whence he came, probably by ſea, into his own country Tarſus in Cilicia.

There he continued about five or ſix years, from the year of Chriſt 37 to the year 43; when Barnabas coming to Antioch by the order of the apoſtles, and there having found many Chriſtians, went to Tarſus to ſee Saul, and brought him with him to Antioch (Acts xi. 20, 25, 26.); where they continued together a whole year, preaching to and inſtructing the faithful. During this time, there happened a great famine in Judea (id. ib. 27, 28, &c.), and the Chriſtians of Antioch having made ſome collections to aſſiſt their brethren at Jeruſalem, they made choice of Paul and Barnabas to go thither with their offering. They arrived there in the year of Chriſt 44; and having acquitted themſelves of their commiſſion, they returned again to Antioch. They had not been there long before God warned them by the prophets he had in this church, that he had appointed them to carry his word into other places. Then the church betook themſelves to faſting and praying, and the prophets Simeon, Lucius, and Manaen, laid their hands on them, and ſent them to preach whither the Holy Ghoſt ſhould conduct them. And it was probably about this time, that is, about the year of Chriſt 44, that Paul being rapt up into the third heaven, ſaw there ineffable things, and which were above the comprehenſion of man (2 Cor. xii. 2, 3, 4. and Acts xiii. 4, 5, 6, &c.).

Saul and Barnabas went firſt into Cyprus, where they began to preach in the ſynagogues of the Jews. When they had gone over the whole iſland, they there found a Jewiſh magician called Bar-jeſus, who was with the proconſul Sergius Paulus; and who reſiſted them, and endeavoured to prevent the proconſul from embracing Chriſtianity: whereupon St Paul ſtruck him with blindneſs; by which miracle the proconſul, being an eye-witneſs of it, was converted to the Chriſtian faith.

From this converſion, which happened at the city of Paphos, in the year of Chriſt 45, many think, that the apoſtle firſt began to bear the name of *Paul*, which St Luke always gives him afterwards, as is ſuppoſed in memory of his converting Sergius Paulus. Some believe

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ſtroy, and whoſe very Shepherd had lately been murdered! Perhaps it was with the view of gratifying ſome licentious paſſion, under the authority of the new religion, that he commenced a teacher of that religion! This cannot be alleged; for his writings breathe nothing but the ſtricteſt morality, obedience to magiſtrates, order, and government, with the utmoſt abhorrence of all licentiouſneſs, idleneſs, or looſe behaviour, under the cloak of religion. We nowhere read in his works, that ſaints are above moral ordinances; that dominion is founded in grace; that monarchy is deſpotiſm which ought to be aboliſhed; that the fortunes of the rich ought to be divided among the poor; that there is no difference in moral actions; that any impulſes of the mind are to direct us againſt the light of our reaſon and the laws of nature; or any of thoſe wicked tenets by which the peace of ſociety has been often diſturbed, and the rules of morality often broken, by men pretending to act under the ſanction of divine revelation. He makes no diſtinctions like the impoſtor of Arabia in favour of himſelf; nor does any part of his life, either before or after his converſion to Chriſtianity, bear any mark of a libertine diſpoſition. As among the Jews, ſo among the Chriſtians, his converſation and manners were blameleſs.—It has been ſometimes objected to the other apoſtles, by thoſe who were reſolved not to credit their teſtimony, that, having been deeply engaged with Jeſus during his life, they were obliged, for the ſupport of their own credit, and from having gone too far to return, to continue the ſame profeſſions after his death; but this can by no means be ſaid of St Paul. On the contrary, whatever force there may be in that way of reaſoning, it all tends to convince us, that St Paul muſt *naturally* have continued a Jew, and an enemy to Chriſt Jeſus. If *they* were engaged on one ſide, *he* was as ſtrongly engaged on the other. If ſhame withheld them from changing ſides, much more ought it to have ſtopped him; who, from his ſuperior education, muſt have been vaſtly more ſenſible to that kind of ſhame than the mean and illiterate fiſhermen of Galilee. The only other difference was, that *they*, by quitting their Maſter after his death, might have preſerved themſelves; whereas *he*, by quitting the Jews, and taking up the croſs of Chriſt, certainly brought on his own deſtruction.

As St Paul was not an impoſtor, ſo it is plain he was not an enthuſiaſt. Heat of temper, melancholy, ignorance, and vanity, are the ingredients of which enthuſiaſm is compoſed; but from all theſe, except the firſt, the apoſtle appears to have been wholly free. That he had great fervour of zeal, both when a Jew and when a Chriſtian, in maintaining what he thought to be right, cannot be denied; but he was at all times ſo much maſter of his temper, as, in matters of indifference, to "become all things to all men," with the moſt pliant condeſcenſion, bending his notions and manners to theirs, as far as his duty to God would permit; a conduct compatible neither with the ſtiffneſs of a bigot nor with the violent impulſes of fanatical deluſion. That he was not melancholy, is plain from his conduct in embracing every method which prudence could ſuggeſt to eſcape danger and ſhun perſecution, lieve that he changed his name upon his own converſion; and Chryſoſtom will have this change to take place at his ordination, when he received his miſſion at Antioch; while others ſay, he took the name *Paul* only when he began to preach to the Gentiles: and, finally, ſeveral are of opinion, that he went by the names of both *Saul* and *Paul*, like many other Jews who had one Hebrew name and another Greek or Latin one.

From the iſle of Cyprus, St Paul and his company went to Perga in Pamphylia, where John Mark left them, to return to Jeruſalem: but making no ſtay at Perga, they came to Antioch in Piſidia; where going into the ſynagogue, and being deſired to ſpeak, St Paul made them a long diſcourſe, by which he ſhowed, that Jeſus Chriſt was the Meſſiah foretold by the prophets, and declared by John the Baptiſt; that he had been unjuſtly put to death by the malice and jealouſy of the Jews; and that he roſe again the third day. They heard him very attentively; and he was deſired to diſcourſe again on the ſame ſubject the next Sabbath-day; and ſeveral, both Jews and Gentiles, followed them, to receive particular inſtructions more at leiſure. On the Sabbath-day following, almoſt all the city met together to hear the word of God: but the Jews, ſeeing the concourſe of people, were moved with envy at it; oppoſed, with blaſphemies, what St Paul ſaid; and not being able to bear the happy progreſs of the goſpel in this country, they raiſed a perſecution againſt the two apoſtles: whereupon Paul and Barnabas, ſhaking off the duſt upon their feet againſt them, came from Antioch in Piſidia to Iconium. Being come thither, they preached in their ſynagogue, and converted a great number, both of Jews and Gentiles; and God confirmed their commiſſion by a great number of miracles (Acts xiv. 1, 2, &c.). In the mean time, the unbelieving Jews, having incenſed the Gentiles againſt Paul and Barnabas, and threatening to ſtone them, they were obliged to retire to Lyſtra and Derbe, cities of Lycaonia, where they preached the goſpel. At Lyſtra, there was a man who had been lame from his mother's womb. This man fixing his eyes on St Paul, the apoſtle bid him riſe, and ſtand upon his feet: whereupon he preſently roſe up, and walked; the people, ſeeing this miracle, cried out, that the gods were deſcended among them in the ſhape of men. They called Barnabas *Jupiter*, and Paul *Mercury*, becauſe of his eloquence, and being the chief ſpeaker. The prieſt of Jupiter brought alſo garlands and bulls before the gate, to offer ſacrifices to them: but Paul and Barnabas rending their clothes, and caſting themſelves into the middle of the multitude, cried out to them, Friends, what do you do? we are men as well as yourſelves; and we are preaching to you to turn away from theſe vain ſuperſtitions, and to worſhip only the true God, who has made heaven and earth. But whatever they could ſay, they had much ado to reſtrain them from offering ſacrifices to them.

In the mean time, ſome Jews of Antioch in Piſidia and of Iconium coming to Lyſtra, animated the people againſt the apoſtles. They ſtoned Paul, and drew him out of the city, thinking him to be dead. But the diſciples gathering together about him, he roſe up among

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cution, when he could do it without betraying the duty of his office or the honour of his God. A melancholy enthuſiaſt courts perſecution; and when he cannot obtain it, afflicts himſelf with abſurd penances: but the holineſs of St Paul conſiſted only in the ſimplicity of a godly life, and in the unwearied performance of his apoſtolical duties. That he was ignorant, no man will allege who is not groſsly ignorant himſelf; for he appears to have been maſter not only of the Jewiſh learning, but alſo of the Greek philoſophy, and to have been very converſant even with the Greek poets. That he was not credulous, is plain from his having reſiſted the evidence of all the miracles performed on earth by Chriſt, as well as thoſe that were afterward worked by the apoſtles; to the fame of which, as he lived in Jeruſalem, he could not poſſibly have been a ſtranger. And that he was as free from vanity as any man that ever lived, may be gathered from all that we ſee in his writings, or know of his life. He repreſents himſelf as the leaſt of the apoſtles, and not meet to be called an apoſtle. He ſays that he is the chief of ſinners; and he prefers, in the ſtrongeſt terms, univerſal benevolence to faith, and prophecy, and miracles, and all the gifts and graces with which he could be endowed. Is this the language of vanity or enthuſiaſm? Did ever fanatic prefer virtue to his own religious opinions, to illuminations of the ſpirit, and even to the merit of martyrdom?

Having thus ſhown that St Paul was neither an impoſtor nor an enthuſiaſt, it remains only to be inquired, whether he was deceived by the fraud of others: but this inquiry needs not be long, for who was to deceive him? A few illiterate fiſhermen of Galilee? It was *morally* impoſſible for ſuch men to conceive the thought of turning the moſt enlightened of their opponents, and the cruelleſt of their perſecutors, into an apoſtle, and to do this by a fraud in the very inſtant of his greateſt fury againſt them and their Lord. But could they have been ſo extravagant as to conceive ſuch a thought, it was *phyſically* impoſſible for them to execute it in the manner in which we find his converſion to have been effected. Could they produce a light in the air, which at mid-day was brighter than the ſun? Could they make Saul hear words from out of that light which were not heard by the reſt of the company? Could they make him blind for three days after that viſion, and then make ſcales fall off from his eyes, and reſtore him to ſight by a word? Or, could they make him and thoſe who travelled with him believe, that all theſe things had happened, if they had not happened? Moſt unqueſtionably no fraud was equal to all this.

Since then St Paul was neither an impoſtor, an enthuſiaſt, nor deceived by the fraud of others, it follows, that his converſion was miraculous, and that the Chriſtian religion is a divine revelation. See Lyttleton's "Obſervations on the Converſion of St Paul;" a treatiſe to which it has been truly ſaid, that infidelity has never been able to fabricate a ſpecious anſwer, and of which this note is a very ſhort and imperfect abridgement.

them, entered again into the city, and the day after left it with Barnabas to go to Derbe. And having here preached the goſpel alſo, they returned to Lyſtra, to Iconium, and to Antioch of Piſidia. Paſſing throughout Piſidia, they came to Pamphylia, and having preached the word of God at Perga, they went down into Attalia. From hence they ſet ſail for Antioch in Syria, from whence they had departed a year before. Being arrived there, they aſſembled the church together, and told them the great things God had done by their means, and how he had opened to the Gentiles a door of ſalvation; and here they continued a good while with the diſciples.

St Luke does not inform us of the actions of St Paul from the 45th year of Chriſt to the time of the council at Jeruſalem, which was held in the 50th year of Chriſt. There is great likelihood that it was during this interval that St Paul preached the goſpel from Jeruſalem to Illyricum, as he informs us in his epiſtle to the Romans (xv. 19.); and this without making any ſtay in thoſe places where others had preached before him. He does not acquaint us with the particulars of theſe journeys, nor with the ſucceſs of his preaching; but he ſays in general, that he had ſuffered more labours than any other, and had endured more priſons. He was often very near death itſelf, ſometimes upon the water and ſometimes among thieves. He run great dangers, ſometimes from the Jews and ſometimes among falſe brethren and perverſe Chriſtians; he was expoſed to great hazards, as well in the cities as in the deſerts: he ſuffered hunger, thirſt, nakedneſs, cold, faſtings, watchings (2 Cor. xi. 23.—27.), and the fatigues inſeparable from long journeys, which were undertaken without any proſpect of human ſuccour; in this very different from the good fortune of others who lived by the goſpel, who received ſubſiſtence from thoſe to whom they preached it, and who were accompanied always by religious women, who miniſtered to them in their neceſſary occaſions. He made it a point of honour to preach gratis, working with his hands that he might not be chargeable to any one (1 Cor. ix. 1.—15.); for he had learned a trade, as was uſual among the Jews, which trade was to make tents of leather for the uſe of thoſe that go to war (Acts xviii. 3.).

St Paul and St Barnabas were at Antioch when ſome perſons coming from Judea (Acts xv. 1, 2, &c.) pretended to teach, that there was no ſalvation without circumciſion, and without the obſervation of the other legal ceremonies. Epiphanius and Philaſter ſay, that he that maintained this was Cerinthus and his followers. Paul and Barnabas withſtood theſe new doctors; and it was agreed to ſend a deputation to the apoſtles and elders at Jeruſalem about this queſtion. Paul and Barnabas were deputed; and being arrived at Jeruſalem, they reported to the apoſtles the ſubject of their commiſſion. Some of the Phariſees that had embraced the faith, aſſerted, that the Gentiles that were converted ought to receive circumciſion, and to obſerve the reſt of the law. But the apoſtles and elders aſſembling to examine into this matter, it was by them decreed, that the Gentiles, who were converted to Chriſtianity, ſhould not be obliged to ſubmit to the yoke of the law, but only to avoid idolatry, fornication, and the eating of things ſtrangled, and blood.

St Paul and St Barnabas were then ſent back to Antioch with letters from the apoſtles, which contained the deciſion of the queſtion, and the reſolution of that auguſt aſſembly. The apoſtles alſo deputed Jude ſurnamed *Barſabas* and Silas, who were principal brethren, to go to Antioch with Paul and Barnabas to give their teſtimony alſo of what had been decreed at Jeruſalem. Being arrived at Antioch, they aſſembled the faithful, read to them the apoſtles letter, and acquainted them, that it had been reſolved to diſcharge them from the yoke of the ceremonial law. Some time after this, St Peter coming to Antioch and joining himſelf to the converted Gentiles, he lived with them without ſcruple; but ſome brethren happening to arrive there from Jeruſalem, he ſeparated himſelf from the Gentile converts, and did no longer eat with them: for which conduct St Paul publicly cenſured him (Gal. ii. 11—16.). St Paul (id. ii. 2, 3, &c.) in the ſame journey to Jeruſalem declared openly to the faithful there the doctrine he preached among the Gentiles; and beſides, diſcourſed of it in private among the chief of them in preſence of Barnabas and Titus. St Peter, St James, and St John, with whom he had theſe converſations, could find nothing either to be added or amended in ſo pure and ſo ſound a doctrine and demeanour. They ſaw with joy the grace that God had given him; they acknowledged that he had been appointed the apoſtle of the Gentiles, as St Peter had been of the circumciſion. They concluded that Paul and Barnabas ſhould continue to preach among the Gentiles; and only recommended to them to take care concerning the collections for the poor; that is to ſay, to exhort the converted Chriſtians among the Gentiles, to aſſiſt the faithful brethren in Judea, who were in neceſſity; whether it were becauſe they had ſold and diſtributed their goods, or becauſe they had been taken away from them (Heb. x. 54.).

After Paul and Barnabas had continued ſome days at Antioch, St Paul propoſed to Barnabas to return and viſit the brethren through all the cities wherein they had planted the goſpel, to ſee in what condition they were. Barnabas conſented to the propoſal; but inſiſted upon taking John Mark along with them. This was oppoſed by Paul, which produced a ſeparation between them. Barnabas and John Mark went together to Cyprus; and St Paul, making choice of Silas, croſſed over Syria and Cilicia, and came to Derbe, and afterwards to Lyſtra (Acts xvi. 1, 2, &c.). Here they found a diſciple, called *Timothy*, whom St Paul took with him, and circumciſed him that he might not offend the Jews of that country. When, therefore, they had gone over the provinces of Lycaonia, Phrygia, and Galatia, the Holy Ghoſt would not allow them to preach the goſpel in the proconſular Aſia, which contained Ionia, Æolia, and Lydia. They therefore went on to Myſia, and coming to Troas, St Paul had a viſion in the night. A man, habited like a Macedonian, preſented himſelf before him, and ſaid, Paſs into Macedonia and come and ſuccour us. Immediately he ſet out on this journey, not doubting but that God had called him into this country.

Embarking therefore at Troas, they ſailed to Neapolis. Thence they came to Philippi, where upon the ſabbath-day they went near the river ſide, where the Jews had a place of devotion, and where they found ſome religious women, among whom was Lydia, who was converted and baptized, and invited the apoſtle and his company to lodge at her houſe. Another day, as they went to the ſame place of devotion, they happened to meet a maid ſervant poſſeſſed with a ſpirit of divination, who followed St Paul and his company, crying out, that theſe men were the ſervants of the moſt high God, who declared to the world the way of ſalvation. This ſhe did for ſeveral days together; at laſt St Paul, turning himſelf towards her, ſaid to the ſpirit, I command thee in the name of Jeſus Chriſt to come out of the body of this woman: upon which it immediately left her. But the maſters of this damſel, who made much money by her, drew Paul and Silas before the magiſtrates, and accuſed them of attempting to introduce a new religion into the city. For this the magiſtrates ordered them to be whipt with rods upon the back and ſhoulders, and afterwards ſent them to priſon.

Towards midnight, as Paul and Silas were ſinging hymns and praiſes to God, on a ſudden there was a great earthquake, ſo that the foundations of the priſon were ſhaken, and all the doors flew open at the ſame time, and the fetters of the priſoners burſt aſunder. The gaoler being awakened at this noiſe, and ſeeing all the doors open, he drew his ſword with an intention to kill himſelf, imagining that all the priſoners had made their eſcape. But Paul cried out to him, that he ſhould do himſelf no miſchief, for they were all ſafe. Then the gaoler entering and finding all the priſoners there, he brought out Paul and Silas from this place, aſking them what he muſt do to be ſaved? Paul and Silas inſtructing him and all his family, gave them baptiſm. After this the gaoler ſet before them ſomething to eat; and when the morning was come, the magiſtrates ſent him word that he might releaſe his priſoners, and let them go about their buſineſs. But Paul returned this anſwer to the magiſtrates; Ye have publicly whipped us with rods, being Roman citizens; ye have thrown us into priſon; and now ye would privately diſmiſs us: But it ſhall not be ſo, for you yourſelves ſhall come to fetch us out. The magiſtrates hearing that they were Roman citizens, came to excuſe themſelves; and having brought them out of priſon, they deſired them to depart out of their city. Paul and Silas went firſt to the houſe of Lydia, where having viſited and comforted the brethren, they departed from Philippi.

Then paſſing through Amphipolis and Apollonia, they came to Theſſalonica the capital city of Macedonia, where the Jews had a ſynagogue (Acts xvii. 1, &c.). Paul entered therein, according to his cuſtom, and there preached the goſpel to them for three Sabbath-days ſucceſſively. Some Jews and ſeveral proſelytes believed in Jeſus Chriſt, and united themſelves to Paul and Silas: but the greateſt part of the Jews being led away by a falſe zeal, raiſed a tumult in the city, and went to the houſe of Jaſon where St Paul lodged. But not finding him there, they took Jaſon and led him before the magiſtrates, where they accuſed him of harbouring in his houſe people that were diſobedient to the ordinances of the emperor, and who affirmed that there was another king beſides him, one Jeſus whom they preached up. But Jaſon having given ſecurity to anſwer for the people who were accuſed, he was diſmiſſed to his own houſe; and the night following the brethren conducted Paul and Silas out of the city, who went to Berea, where they began to preach in the ſynagogue. The Jews of Berea heard them gladly, and many of them were converted; as alſo ſeveral of the Gentiles, and many women of diſtinction that were not Jeweſſes.

The Jews of Theſſalonica being informed that Paul and Silas were at Berea, came thither and animated the mob againſt them; ſo that St Paul was forced to withdraw, leaving Silas and Timothy at Berea to finiſh the work he had ſo happily begun. Thoſe who conducted St Paul embarked along with him, and brought him as far as Athens (Theod. in 1 Theſſal.), where he arrived in the 52d year of Jeſus Chriſt. As ſoon as he was got thither, he ſent back thoſe that had brought him, with orders to tell Silas and Timothy, that he deſired them to follow him to Athens as ſoon as poſſible. In the mean time, he went into a ſynagogue of the Jews, and preached to them as often as he had opportunity; and diſputing with the philoſophers who were frequent in that place, they at laſt brought him before the Areopagus, accuſing him of introducing a new religion. St Paul being come before the judges, pleaded in his own defence, that among other marks of ſuperſtition which he had found in that city, he had obſerved an altar inſcribed, "To the unknown God." It was therefore this God whom they confeſſed that they knew not, that he came to make known to them. Afterwards he ſpoke to them of God the creator of heaven and earth, of the ſuperintendence of a providence, of the laſt judgement, and of the reſurrection of the dead. But after they had heard of the reſurrection, ſome made ſcorn of him, and others deſired to hear him another time. However ſome of them embraced the Chriſtian faith, of which number was Dionyſius a ſenator of the Areopagus, and a woman called *Damaris*, and ſeveral others with them.

St Timothy came from Berea to Athens according to the requeſt of St Paul, and informed him of the perſecution with which the Chriſtians of Theſſalonica were then afflicted. This obliged the apoſtle to ſend him into Macedonia, that he might comfort them and keep them ſtedfaſt (1 Theſſal. iii. 1, 2, &c.). After this St Paul left Athens and went to Corinth, where he lodged with one Aquila a Jew, and by trade a tentmaker (Acts xviii. 1, 2, &c.). With this Aquila the apoſtle worked, as being of the ſame trade himſelf. But, however, he did not neglect the preaching of the goſpel, which he performed every day in the ſynagogue; ſhowing both to the Jews and Gentiles that Jeſus was the Meſſiah. There he made ſeveral converts: and he tells us himſelf (1 Cor. i. 14—17. and xvi. 15.) that he baptized Stephanus and his whole houſe, with Criſpus and Gaius. About the ſame time Silas and Timothy came to Corinth, and acquainted him with the good ſtate of the faithful at Theſſalonica; and ſoon after this, he wrote his firſt epiſtle to the Theſſalonians, which is the firſt of all the epiſtles that he wrote; and not long after he wrote his ſecond epiſtle to that church.

St Paul, now finding himſelf encouraged by the preſence of Silas and Timothy, went on with the work of his miniſtry with new ardour, declaring and proving that Jeſus Chriſt was the true Meſſiah. But the Jews oppoſing him with blaſphemous and opprobrious words, he ſhook his clothes at them, and ſaid, "Your blood be upon your own head; from henceforth I ſhall go to the Gentiles." He then quitted the houſe of Aquila, and went to lodge with one Titus Juſtus, who was original-by a Gentile, but one that feared God. In the mean time the Lord appeared to St Paul in a viſion, told him, that in Corinth he had much people; and this was the reaſon why the apoſtle continued there eight months.

But Gallio the proconſul of Achaia being at Corinth, the Jews of that city roſe up againſt Paul and carried him before Gallio, accuſing him of attempting to introduce a new religion among them: however, Gallio ſent them away, telling them he would not meddle with diſputes that were foreign to his office Paul continued ſome time longer at Corinth; but at laſt he ſet out for Jeruſalem, where he had a mind to be preſent at the feaſt of Pentecoſt. Before he went on ſhipboard, he cut off his hair at Cenchrea, becauſe he had completed his vow of Nazariteſhip, in which he had engaged himſelf. He arrived at Epheſus with Aquila and Priſcilla, from whence he went to Cæſarea of Paleſtine, and thence to Jeruſalem. Here having performed his devotions, he came to Antioch, where he ſtayed ſome time; and then paſſing from thence, he made a progreſs through all the churches of Galatia and Phrygia ſucceſſively; and having gone over the higher provinces of Aſia, he returned to Epheſus, where he abode three years; that is, from the year of Chriſt 54 to the year 57 (Acts xix. 1, 2, &c.).

St Paul having arrived at Epheſus, he found there ſome diſciples that had been initiated by Apollos, who had only baptized them with the baptiſm of John. St Paul inſtructed them, baptized them with the baptiſm of Jeſus Chriſt, and laid his hands on them; whereupon they received the Holy Ghoſt, the gifts of languages and of prophecy. The apoſtle afterwards went into the ſynagogue, and preached to the Jews for three months, endeavouring to convince them that Jeſus Chriſt was the Meſſiah: but as he found them very obſtinate, he ſeparated himſelf from them, and taught daily in the ſchool of one Tyrannus. He performed there ſeveral miracles, inſomuch, that the linen that had but touched his body, being afterwards applied to the ſick, they were preſently cured of their diſeaſes, or delivered from the devils that poſſeſſed them. He alſo ſuffered much there, as well from the Jews as from the Gentiles; and he himſelf informs us (1 Cor. xv. 31, 32.), that after the manner of men he fought with beaſts at Epheſus; that is to ſay, that he was expoſed to wild beaſts in the amphitheatre, ſo that it was expected he ſhould have been devoured by them; but God miraculouſly delivered him: though ſome are of opinion, that the fight here mentioned by St Paul was nothing elſe but the ſcuffle he had with Demetrius the ſilver-ſmith and his companions, who were diſappointed in their attempt of putting the apoſtle to death. It was during his abode at Epheſus that the apoſtle wrote his epiſtle to the Galatians.

After this St Paul propoſed, at the inſtigation of the Holy Ghoſt, to paſs through Macedonia and Achaia, and afterwards to go to Jeruſalem, ſaying, that after he had been there, he muſt alſo ſee Rome; and having ſent Timothy and Eraſtus before to Macedonia, he tarried ſome time in Aſia. During this time, he received intelligence that domeſtic troubles had riſen in the church of Corinth, and that abuſes had begun to creep in; which made him reſolve to write his firſt epiſtle to that church.

Soon after this, taking leave of the diſciples, he departed for Macedonia (Acts xx. 1, 2, &c.). He embarked at Troas, took Timothy with him, and together paſſed into Macedonia (2 Cor. ii. 12. and vii. 5—15.). Titus came thither to him, and acquainted him with the good effects that his letter had produced among the Corinthians; and told him, that the collections that had been made by the church of Corinth for the faithful in Paleſtine were now ready; which engaged Paul to write a ſecond letter to the Corinthians. St Paul, having paſſed through Macedonia, came into Greece or Achaia, and there continued three months. He viſited the faithful of Corinth: and having received their alms, as he was upon the point of returning into Macedonia, he wrote his epiſtle to the Romans.

At laſt he left Greece and came into Macedonia, in the year of Chriſt 58, intending to be at Jeruſalem at the feaſt of Pentecoſt. He ſtaid ſome time at Philippi, and there celebrated the feaſt of the paſſover. From hence he embarked and came to Troas, where he continued a week. On the firſt day of the week the diſciples being aſſembled to break bread, as St Paul was to depart the day following, he made a diſcourſe to them which held till midnight. During this time a young man called Eutychus, happening to ſit in a window and fall aſleep, fell down three ſtories high, and was killed by the fall. St Paul came down to him, and embraced him, and reſtored him to life again. Then he went up again, broke bread and ate it, and continued his diſcourſe till daybreak, at which time he departed. Thoſe of his company took ſhip at Troas; but as for himſelf he went on foot as far as Aſſos, otherwiſe called *Apollonia*, and then embarked along with them at Mitylene. From hence he came to Miletus, whither the elders of the church of Epheſus came to ſee him; for he had not time to go to them, becauſe he was deſirous of being at Jeruſalem at the feaſt of Pentecoſt.

When theſe elders had arrived at Miletus, St Paul diſcourſed with them, and told them that he was going to Jeruſalem without certainly knowing what ſhould happen to him; however he did not doubt but that he had much to ſuffer there, ſince in all cities the Holy Ghoſt had given him to underſtand, that chains and afflictions waited for him at Jeruſalem. Nevertheleſs, he declared to them, that all this did not terrify him, provided he could but fulfil his miniſtry. After having exhorted them to patience, and having prayed along with them, he went on board, going ſtraight to Coos, then to Rhodes, and thence to Patara (Acts xxi. 1, 2, &c.), where finding a ſhip that was bound for Phœnicia, they went on board and arrived ſafe at Tyre. Here they made a ſtop for ſeven days, and then going on, they arrived at Ptolemais, and thence at Cæſarea, where they found Philip the evangeliſt, who was one of the ſeven deacons. While St Paul was there, the prophet Agabus arrived there alſo from Judea; and have taken St Paul's girdle, he bound his own hands and feet with it, ſaying, "Thus ſhall the Jews of Jeruſalem bind the man that owns this girdle, and ſhall deliver him up to the Gentiles." But St Paul's conſtancy was not ſhaken by all theſe predictions, and he told them, that he was ready, not only to ſuffer bonds, but death itſelf, for the name of Chriſt.

When he was come to Jeruſalem, the brethren received him with joy; and the day following he went to ſee St James the leſs, biſhop of Jeruſalem, at whoſe houſe all the elders aſſembled. Paul gave them an account of what God had done among the Gentiles by his miniſtry. Then St James informed him, that the converted Jews were ſtrangely prejudiced againſt him, becauſe they were informed he taught the Jews that lived among the Gentiles and out of Paleſtine, that they ought to renounce the law of Moſes, and no longer circumciſe their children. Therefore, continued St James, we muſt aſſemble them here together, where you may ſpeak to them yourſelf, and undeceive them. Moreover do this, that your actions may verify your words: join yourſelf to four men that are here, and who have taken upon them a vow of Nazariteſhip; and that you may ſhare in the merit of their action, contribute to the charge of their purification, and purify yourſelf alſo, that you may offer with them the offerings and ſacrifices ordained for the purification of a Nazarite. See NAZARITE.

St Paul exactly followed this advice of St James, and on the next day went into the temple, where he declared to the prieſts, that in ſeven days theſe four Nazarites would complete their vow of Nazariteſhip; and that he would contribute his ſhare of the charges. But towards the end of theſe ſeven days, the Jews of Aſia having ſeen him in the temple, moved all the people againſt him, laid hold of him, and cried out, "Help, ye Iſraelites, that is he that teaches every where againſt the law, and againſt the temple, and has brought Gentiles into the temple, and profaned this holy place." At the ſame time they laid hold on him, ſhut the gates of the temple, and would have killed him, had not Lyſias the tribune of the Roman garriſon there run to his reſcue, taken him out of their hands, and brought him into the citadel. St Paul being upon the ſteps, deſired the tribune to ſuffer him to ſpeak to the people, who followed him thither in a great multitude. The tribune permitted him, and St Paul, making a ſign with his hand, made a ſpeech in Hebrew (Acts xxii.), and related to them the manner of his converſion, and his miſſion from God to go and preach to the Gentiles. At his mentioning the Gentiles, the Jews began to cry out, "Away with this wicked fellow out of the world, for he is not worthy to live."

Immediately the tribune made him come into the caſtle, and ordered that he ſhould be examined by whipping him, in order to make him confeſs the matter why the Jews were ſo incenſed againſt him. Being now bound, he ſaid to the tribune, "Is it lawful for you to whip a Roman citizen before you hear him?" The tribune hearing this, cauſed him to be unbound, and calling together the prieſts and the ſenate of the Jews, he brought Paul before them, that he might know the occaſion of this tumult of the people. Then Paul began to ſpeak to them to this purpoſe, (Acts xxiii.): "Brethren, I have lived in all good conſcience before God until this day." At which words, Ananias, ſon of Nebedeus, who was the chief-prieſt, ordered the byſtanders to give him a blow in the face. At which St Paul ſaid to him, "God ſhall ſmite thee, thou whited wall; for ſitteſt thou to judge me after the law, and commandeſt me to be ſmitten contrary to the law?" Thoſe that were preſent ſaid to him, "Revileſt thou God's high prieſt?" St Paul excuſed himſelf by ſaying, that he did not know he was the high-prieſt, "For it is written, thou ſhalt not ſpeak evil of the ruler of thy people." Then perceiving that part of the aſſembly were Sadducees and part Phariſees, he cried out, "Brethren, I am a Phariſee, the ſon of a Phariſee; of the hope and reſurrection of the dead I am called in queſtion."

Then the aſſembly being divided in intereſts and opinions, and the clamour increaſing more and more, the tribune ordered the ſoldiers to fetch him away out of the aſſembly, and bring him into the caſtle. The following night the Lord appeared to Paul, and ſaid to him, "Take courage, for as you have borne teſtimony of me at Jeruſalem, ſo muſt you alſo at Rome." The day following more than 40 Jews engaged themſelves by an oath, not to eat or drink till they had killed Paul. They came, therefore, and made known their deſign to the prieſts and chiefs of the people, ſaying to them, "To-morrow cauſe Paul to appear before you, as if you would inquire more accurately into his affair, and before he can come to you, we will lie in wait for him and kill him." But St Paul, being informed of this conſpiracy by his ſiſter's ſon, acquainted the tribune with it; who gave orders that the night following he ſhould be ſent to Cæſarea, to Felix the governor, who had his ordinary reſidence there. Felix having received letters from Lyſias, and being informed that St Paul was of Cilicia, he told him he would hear him when his accuſers ſhould arrive.

Five days after, Ananias the high-prieſt and ſome of the ſenators came to Cæſarea, bringing with them Tertullus the orator, to plead againſt Paul. Tertullus accuſed him of being a ſeditious perſon, a diſturber of the public peace; one who had put himſelf at the head of a ſect of Nazarenes, and who made no ſcruple even to profane the temple, (*id.* xxiv.). But St Paul eaſily refuted theſe calumnies, and defied his accuſers to prove any of the articles they had exhibited againſt him: he ended his diſcourſe by ſaying, "That for the doctrine of the reſurrection from the dead, his adverſaries would have him condemned." Felix put off the further hearing of this cauſe till another time; and, ſome days afterwards, came himſelf with his wife Druſilla to hear Paul; and being in hopes that the apoſtle would purchaſe his freedom with a ſum of money, he uſed him well, often ſent for him, and had frequent converſations with him.

Two years having thus paſſed away, Felix made way for his ſucceſſor Portius Feſtus; but being willing to oblige the Jews, he left Paul in priſon. Feſtus being come to Jeruſalem, the chief prieſts deſired to ſend for Paul, with a deſign to fall upon him by the way. But Feſtus told them, they might come to Cæſarea, where he would do them juſtice. Hither the Jews came, and accuſed Paul of ſeveral crimes, of which they were able to prove nothing (*id.* xxv.). Feſtus then propoſed to the apoſtle to go to Jeruſalem, and be tried there; but he anſwered, "That he was now at the emperor's tribunal, where he ought to be tried; and that he appealed to Cæſar:" whereupon Feſtus, having conferred with his council, told him, that therefore to Cæſar he ſhould go.

Some days after, King Agrippa and his wife Berenice coming to Cæſarea, deſired to hear Paul: who pleaded.

pleaded his cauſe with ſuch ability, that Agrippa exclaimed, "Almoſt thou perſuadeſt me to be a Chriſtian." See AGRIPPA.

As ſoon, therefore, as it was reſolved to ſend Paul into Italy, he was put on board a ſhip at Adramyttium, a city of Myſia; and having paſſed over the ſeas of Cilicia and Pamphylia, they arrived at Myra, in Lycia, where, having found a ſhip that was bound for Italy, they went on board, (*id.* xxvii.). But the ſeaſon being far advanced (for it was at leaſt the latter end of September), and the wind proving contrary, they with much difficulty arrived at the Fair Haven, a port in the iſle of Crete. St Paul adviſed them to winter there: however, others were of opinion they had better go to Phenice, another harbour of the ſame iſland; but as they were going thither, the wind drove them upon a little iſland called *Clauda*, where the mariners, fearing to ſtrike upon ſome bank of ſand, they lowered their maſt, and ſurrendered themſelves to the mercy of the waves. Three days after this, they threw overboard the tackling of the ſhip. Neither ſun nor ſtars had appeared now for 14 days. In this extreme danger, an angel appeared to St Paul, and aſſured him, that God had given him the lives of all that were in the ſhip with him; which were in all 276 ſouls. St Paul told them of his viſion, exhorted them to take courage, and promiſed them that they ſhould all come alive into an iſland; and that the veſſel only ſhould be loſt. On the 14th night the ſeamen caſt out the lead, and thought by their ſounding that they approached near to ſome land. They were attempting to ſave themſelves by going into the boat; but St Paul told the centurion and the ſoldiers, that except the ſailors continued in the ſhip, their lives could not be ſaved. Then the ſoldiers cut the ropes of the boat, and let her drive. About daybreak, St Paul perſuaded them to take ſome nouriſhment, aſſuring them that not a hair of their heads ſhould periſh. After his example, they took ſome food, and when they had eaten, they lightened their veſſel, by throwing the corn into the ſea. Day being come, they perceived a ſhore, where they reſolved, if poſſible, to bring the ſhip to. But the veſſel having ſtruck againſt a neck of land that run out into the ſea, ſo that the head remained fixed, and the ſtern was expoſed to the mercy of the waves; the ſoldiers, fearing leſt any of the priſoners ſhould make their eſcape by ſwimming, were for putting them all to the ſword. But the centurion would not ſuffer them, being willing to ſave Paul; and he commanded thoſe that could ſwim to throw themſelves firſt out of the veſſel; and the reſt got planks, ſo that all of them came ſafe to ſhore. Then they found that the iſland was called *Melita* or *Malta*; the inhabitants of which received them with great humanity, (Acts xxvii. 1, 2, 3, &c.).

They being all very wet and cold, a great fire was lighted to dry them; and Paul having gathered up a handful of ſticks, and put them upon the fire, a viper leaped out of the fire, and took hold of his hand. Then the barbarous people ſaid to one another, "Without doubt this man is a murderer; and though he has been ſaved from the ſhipwreck, yet divine vengeance ſtill purſues him, and will not ſuffer him to live." But Paul, ſhaking the viper into the fire, received no injury from it. The people, ſeeing this, changed their opinion of him, and took him for a god; which opinion of theirs was more confirmed, by his curing the father of Publius, the chief man of the iſland, of a fever and bloody-flux. After this miracle, they all brought out their ſick to him, and they were healed. See MELITA.

At the end of three months they embarked again; and arrived, firſt at Syracuſe, then at Rhegium, and laſtly at Puteoli. Here St Paul found ſome Chriſtians, who detained him for ſeven days; then he ſet out for Rome. The bretaren of this city having been informed of St Paul's arrival, came to meet him as far as Appii-forum, and the Three Taverns. And when he was come to Rome, he was allowed to dwell where he pleaſed, having a ſoldier to guard him, who was joined to him with a chain. Three days afterwards, St Paul deſired the chief of the Jews there to come to him. He related to them in what manner he had been ſeized in the temple of Jeruſalem, and the neceſſity he was under of appealing to Cæſar. The Jews told him, that as yet they had received no information about his affair; and, as for Chriſtianity, they knew nothing of it, but only that it was ſpoken againſt everywhere; however, that they ſhould be very willing to have ſome account of that doctrine from him. A day was appointed for this purpoſe; when St Paul preached to them concerning the kingdom of God, endeavouring to convince them from Moſes and the prophets, that Jeſus was the Meſſiah. Some of them believed what he had ſaid to them, while others diſbelieved; ſo that they returned from him divided among themſelves.

Paul dwelt for two whole years at Rome, from the year of Chriſt 61 to the year 63, in a lodging that he hired; where he received all that came to him, preaching the kingdom of God, and the religion of Jeſus Chriſt, without any interruption.

Hitherto we have had the Acts of the Apoſtles for our guide, in compiling the hiſtory of St Paul; what we ſhall add hereafter, will be moſtly taken from his own Epiſtles. His captivity did not a little contribute to the advancement of religion; for he converted ſeveral perſons even of the emperor's court, (Philip. i. 12—18. and iv. 22.). The Chriſtians of Philippi, in Macedodonia, hearing that St Paul was a priſoner at Rome, ſent Epaphroditus their biſhop to him, to bring him money, and otherwiſe to aſſiſt him in their name, (Phil. ii. 25.). Epaphroditus fell ſick at Rome; and when he went back to Macedonia, the apoſtle ſent by him his Epiſtle to the Philippians.

It is not known by what means St Paul was delivered from his priſon, and diſcharged from the accuſation of the Jews. There is great probability that they durſt not appear againſt him before the emperor, as not having ſufficient proof of what they laid to his charge. However that may be, it is certain that he was ſet at liberty, after having been two years a priſoner at Rome. He wrote alſo. during this impriſonment, his Epiſtles to Philemon and the Coloſſians.

He was ſtill in the city of Rome, or at leaſt in Italy, when he wrote his Epiſtle to the Hebrews. St Paul, having got out of priſon, went over Italy; and, according to ſome of the fathers, paſſed into Spain; then into Judea; went to Epheſus, and there left Timothy (Heb. xiii. 24. and 1 Tim. i. 3.); preached in Crete, and there fixed Titus, to take care to cultivate the church he had planted in that place. Probably he might alſo viſit the Philippians, according to the promiſe he had made them, (Phil. i. 25. 26. and ii. 24.); and it is believed, that it was from Macedonia that he wrote the Firſt Epiſtle to Timothy.—Some time after, he wrote to Titus, whom he had left in Crete; he deſires him to come to Nicopolis, from whence, probably, he ſent this letter. The year following, that is, the 65th year of the Chriſtian era, the apoſtle went into Aſia, and came to Troas, (2 Tim. iv. 13.). Thence he went to viſit Timothy at Epheſus, and from that to Miletus, (2 Tim. iv. 20.). Laſtly, he went to Rome; and St Chryſoſtom ſays, that it was reported, that having converted a cupbearer and a concubine of Nero, this ſo provoked the emperor, that he cauſed St Paul to be apprehended, and clapped into priſon. It was in this laſt place of confinement that he wrote his Second Epiſtle to Timothy, which Chryſoſtom looks upon as the apoſtle's laſt teſtament. See TIMOTHY and TITUS.

This great apoſtle at laſt conſummated his martyrdom, the 29th of June, in the 66th year of Jeſus Chriſt, by having his head cut off, at a place called the *Salvian Waters*. He was buried on the way of Oſtium, and a magnificent church was built over his tomb, which is in being to this day. *Calmet's Dict.* &c.

PAUL, *St*, *Cave or Grotto of*, in the iſland of Malta, where St Paul and his company took ſhelter from the rains, when the viper faſtened on his arm. Upon this ſpot there is a church built by the famed Alof de Vignacourt, grand-maſter of the order, in the year 1606, a very handſome, though but a ſmall, ſtructure. On the altar-piece is a curious painting, repreſenting the apoſtle's ſhaking off the viper, ſurrounded with men, women, and children, in attitudes of admiration and ſurpriſe, and in the old Malteſe garb; and the whole very well executed. On the top of the painting is the following inſcription:

> Vipera ignis acta calore fruſtra Pauli
> Manum invadit; is inſulæ benedicens
> Anguibus et herbis adimit omne virus.
> M.DC.V.

PAUL, firſt biſhop of Narbonne, or Sergius Paulus the proconſul, converted and made biſhop by St Paul, was deſcended from one of the beſt families of Rome. It is ſaid the apoſtle called himſelf *Paul*, from his name. The Spaniards will have him to be their apoſtle, which is not improbable; and it is ſaid he died a martyr at Narbonne.

PAUL V. by birth a Roman, was firſt clerk of the chamber, and afterwards nuncio to Clement VIII. in Spain, who honoured him with a cardinal's hat. He was advanced to the papal chair the 16th of May 1605, after Leo XI. The ancient quarrel between the ſecular and eccleſiaſtical juriſdictions, which in former times had occaſioned ſo much bloodſhed, revived in the reign of this pontiff. The ſenate of Venice had condemned by two decrees, 1. The new foundations of monaſteries made without their concurrence. 2. The alienation of the eſtates both eccleſiaſtical and ſecular. The firſt decree paſſed in 1603, and the ſecond in 1605. About the ſame time a canon and abbot, accuſed of rapine and murder, were arreſted by order of the ſenate, and delivered over to the ſecular court; a circumſtance which could not fail to give offence to the court of Rome. Clement VIII. thought it proper to diſſemble or take no notice of the affair; but Paul V. who had managed the Genoeſe upon a ſimilar occaſion, flattered himſelf with the hopes that the Venetians would be equally pliant. However, he was diſappointed; for the ſenate maintained that they held their power to make laws of God only; and therefore they refuſed to revoke their decrees and deliver up the eccleſiaſtical priſoners into the hands of the nuncio, as the pope demanded. Paul, provoked at this behaviour, excommunicated the doge and ſenate; and threatened to put the whole ſtate under an interdict, if ſatisfaction was not given him within the ſpace of 24 hours. The ſenate did no more than proteſt againſt this menace, and forbid the publication of it throughout their dominions. A number of pamphlets, from both ſides, ſoon announced the animoſity of the two parties. The Capuchins, the Theatins, and Jeſuits, were the only religious orders who obſerved the interdict. The ſenate ſhipped them all off for Rome, and the Jeſuits were baniſhed for ever. Meantime his holineſs was preparing to make the refractory republic ſubmit to his ſpiritual tyranny by force of arms. He levied troops againſt the Venetians; but he ſoon found his deſign baulked, as the cauſe of the Venetians appeared to be the common cauſe of all princes. He had recourſe, therefore, to Henry IV. to ſettle the differences: and this prince had all the honour of bringing about a reconciliation between the contending parties. His ambaſſadors at Rome and Venice began the negotiation, and Cardinal de Joyeuſe finiſhed it in 1607. It was agreed upon, that this cardinal ſhould declare at his entry into the ſenate, that the cenſures of the church were to be taken off, or that he would remove them; and that the doge ſhould at the ſame time ſurrender to him the deeds of revocation and proteſt. It was alſo ſtipulated, that all the religious who were baniſhed, except the Jeſuits, ſhould be reſtored to their former privileges. In fine, the Venetians promiſed to ſend an ambaſſador extraordinary to Rome, in order to thank the pope for the favour he had done them; but they would not allow the legate to ſpeak of his holineſs granting them abſolution. Paul was wiſe enough to overlook the whole matter, but endeavoured to put an end to another diſpute, which had been long agitated in the congregations *de auxiliis*. He cauſed it to be intimated in form to the diſputants and counſellors, that, as the congregations were now diſſolved, it was his expreſs order that the contending parties ſhould no longer continue to cenſure one another. Some authors have affirmed that Paul V. had drawn out a bull againſt the doctrine of Molina, which only wanted to be promulged; but for this fact there appears to be no other evidence than the draught of this bull, which we meet with in the end of the hiſtory of the above-mentioned congregations. Paul was ſtrongly ſolicited, but in vain, to make *the immaculate conception of the holy virgin* an article of faith. He contented himſelf with fairly forbidding the contrary doctrine to be publicly taught, that he might not offend the Dominicans, who, at that time, maintained that ſhe was conceived, like other human creatures, in original ſin. His holineſs afterwards applied himſelf to the embelliſhing of Rome, and was at great pains to collect the works of the moſt eminent painters and engravers. Rome is indebted to him for its moſt beautiful fountains, eſpecially that where the water ſpouts out from an antique vaſe taken from the thermæ or hot-baths of Veſpaſian, and that which they call *aqua Paola*, an ancient work of Auguſtus, reſtored by Paul V. He brought water into it by an aqueduct 35 miles in length, after the example of Sixtus V. He completed the frontiſpiece of St Peter, and the magnificent palace of Mount Cavallo. He applied himſelf in a particular manner to the recovering and repairing ancient monuments, which he made to advance, as much as the nature of them would admit, the honour of Chriſtianity; as appears from an elegant inſcription placed upon a column of porphyry, taken from the temple of Peace, and bearing a beautiful ſtatue of the Virgin, at the ſide of the church of St Mary the elder:

“ Impura falſi templa
Quondam numinis
Jubente moeſta perferebam Cæſare:
Nunc læta veri
Perferens matrem Dei
Te, Paule, nullis obticebo ſæculis.”

His pontificate was honoured with ſeveral illuſtrious embaſſies. The kings of Japan, Congo, and other Indian princes, ſent ambaſſadors to him. He took care to ſupply them with miſſionaries, and to found biſhopricks in theſe countries newly brought over to the faith. He ſhowed the ſame attention to the Maronites and other eaſtern Chriſtians. He ſent legates to different orthodox princes, both to teſtify his eſteem for them, and to confirm them in their zeal for religion. He died the 28th of January 1621, aged 69; after having confirmed the French Oratory, the Urſulines, the Order of Charity, and ſome other inſtitutions. Bold in his claims, but of narrow views, he diſtinguiſhed himſelf more by his piety and knowledge than by his politics. It has been remarked, that he never paſſed a ſingle day of his popedom without celebrating maſs. He enjoined all the religious in the proſecution of their ſtudies to have regular profeſſors for Latin, Greek, Hebrew, and Arabic; if there were any among themſelves properly qualified; or if that was not the caſe, to take the aſſiſtance of laymen for that purpoſe, until there were ſome of their own order who had learning enough to inſtruct their brethren. It was very difficult to carry this decree into execution; and indeed it was always very imperfectly obſerved.

Paul, *Father*, whoſe name, before he entered into the monaſtic life, was Peter Sarpi, was born at Venice, Auguſt 14. 1552. His father followed merchandiſe, but with ſo little ſucceſs, that at his death he left his family very ill provided for; but under the care of a mother whoſe piety was likely to bring the bleſſing of providence upon them, and whoſe wiſe conduct ſupplied the want of fortune by advantages of greater value. Happily for young Sarpi ſhe had a brother, maſter of a celebrated ſchool, under whoſe direction he was placed by her. Here he loſt no time, but cultivated his abilities, naturally of the firſt rate, with unwearied application. He was born for ſtudy, having a natural averſion to pleaſure and gaiety, and a memory ſo tenacious that he could repeat 30 verſes upon once hearing them. Proportionable to his capacity was his progreſs in literature: at 13, having made himſelf maſter of ſchool learning, he turned his ſtudies to philoſophy and the mathematics, and entered upon logic under Capella of Cremona, who, though a celebrated maſter of that ſcience, confeſſed himſelf in a very little time unable to give his pupil any farther inſtructions.

As Capella was of the order of the Servites, his ſcholar was induced by his acquaintance with him to engage in the ſame profeſſion, though his uncle and his mother repreſented to him the hardſhips and auſterities of that kind of life, and adviſed him with great zeal againſt it. But he was ſteady in his reſolutions, and in 1566 took the habit of the order, being then only in his 14th year, a time of life in moſt perſons very improper for ſuch engagements, but in him attended with ſuch maturity of thought, and ſuch a ſettled temper, that he never ſeemed to regret the choice he then made, and which he confirmed by a ſolemn public profeſſion in 1572.

At a general chapter of the Servites held at Mantua, Paul (for ſo we ſhall now call him) being then only 20 years old, diſtinguiſhed himſelf ſo much in a public diſputation by his genius and learning, that William duke of Mantua, a great patron of letters, ſolicited the conſent of his ſuperiors to retain him at his court, and not only made him public profeſſor of divinity in the cathedral, and reader of caſuiſtical divinity and canon law in that city, but honoured him with many proofs of his eſteem. But Father Paul finding a court life not agreeable to his temper, quitted it two years afterwards, and retired to his beloved privacies, being then not only acquainted with the Latin, Greek, Hebrew, and Chaldee languages, but with philoſophy, the mathematics, canon and civil law, all parts of natural philoſophy, and chemiſtry itſelf; for his application was unintermitted, his head clear, his apprehenſion quick, and his memory retentive.

Being made a prieſt at 22, he was diſtinguiſhed by the illuſtrious Cardinal Borromeo with his confidence, and employed by him on many occaſions, not without the envy of perſons of leſs merit, who were ſo far exaſperated as to lay a charge againſt him before the Inquiſition, for denying that the Trinity could be proved from the firſt chapter of Geneſis; but the accuſation was too ridiculous to be taken notice of. After this he paſſed ſucceſſively through the dignities of his order, of which he was choſen provincial for the province of Venice at 26 years of age; and diſcharged this poſt with ſuch honour, that in 1579 he was appointed, with two others, to draw up new regulations and ſtatutes for his order. This he executed with great ſucceſs; and when his office of provincial was expired, he retired for three years to the ſtudy of natural and experimental philoſophy and anatomy, in which he is ſaid to have made ſome uſeful diſcoveries. In the intervals of his employment he applied himſelf to his ſtudies with ſo extenſive a capacity, as left no branch of knowledge untouched. By him Acquapendente, the great anatomiſt, confeſſes that he was informed how viſion is performed; and there are proofs that he was not a ſtranger to the circulation of the blood. He frequently converſed upon aſtronomy with mathematicians, upon anatomy with ſurgeons, upon medicine with phyſicians, and with chemiſts upon the analyſis of metals, not as a ſuperficial inquirer, but as a complete maſter. He was then choſen procurator general of his order; and during his reſidence at Rome was greatly eſteemed by Pope Sixtus V. and contracted an intimate friendſhip with Cardinal Bellarmine and other eminent perſons.

But the hours of repoſe, which he employed ſo well, were interrupted by a new information in the Inquiſition; where a former acquaintance produced a letter written by him in cyphers, in which he ſaid, "that he deteſted the court of Rome, and that no preferment was obtained there but by diſhoneſt means." This accuſation, however dangerous, was paſſed over on account of his great reputation; but made ſuch impreſſions on that court, that he was afterwards denied a biſhopric by Clement VIII. After theſe difficulties were ſurmounted, F. Paul again retired to his ſolitude; where he appears, by ſome writings drawn up by him at that time, to have turned his attention more to improvement in piety than learning. Such was the care with which he read the ſcriptures, that, it being his cuſtom to draw a line under any paſſage which he intended more nicely to conſider, there was not a ſingle word in his New Teſtament but was underlined. The ſame marks of attention appeared in his Old Teſtament, Pſalter, and Breviary.

But the moſt active ſcene of his life began about the year 1615; when Pope Paul V. exaſperated by ſome decrees of the ſenate of Venice that interfered with the pretended rights of the church, laid the whole ſtate under an interdict. The ſenate, filled with indignation at this treatment, forbade the biſhops to receive or publiſh the pope's bull; and, convening the rectors of the churches, commanded them to celebrate divine ſervice in the accuſtomed manner, with which moſt of them readily complied: but the Jeſuits and ſome others refuſing, were by a ſolemn edict expelled the ſtate. Both parties having proceeded to extremities, employed their ableſt writers to defend their meaſures. On the pope's ſide, among others, Cardinal Bellarmine entered the liſts, and, with his confederate authors, defended the papal claims with great ſcurrility of expreſſion, and very ſophiſtical reaſonings; which were confuted by the Venetian apologiſts in much more decent language, and with much greater ſolidity of argument. On this occaſion F. Paul was moſt eminently diſtinguiſhed by his Defence of the Rights of the ſupreme Magiſtrate, his Treatiſe of Excommunication, tranſlated from Gerſon, with an Apology, and other writings; for which he was cited before the Inquiſition at Rome: but it may be eaſily imagined that he did not obey the ſummons.

The Venetian writers, whatever might be the abilities of their adverſaries, were at leaſt ſuperior to them in the juſtice of their cauſe. The propoſitions maintained on the ſide of Rome were theſe: That the pope is inveſted with all the authority of heaven and earth: that all princes are his vaſſals, and that he may annul their laws at pleaſure: that kings may appeal to him, as he is temporal monarch of the whole earth: that he can diſcharge ſubjects from their oaths of allegiance, and make it their duty to take up arms againſt their ſovereign: that he may depoſe kings without any fault committed by them, if the good of the church requires it: that the clergy are exempt from all tribute to kings, and are not accountable to them even in caſes of high-treaſon: that the pope cannot err: that his deciſions are to be received and obeyed on pain of ſin, though all the world ſhould judge them to be falſe: that the pope is God upon earth: that his ſentence and that of God are the ſame: and that to call his power in queſtion is to call in queſtion the power of God: maxims equally ſhocking, weak, pernicious, and abſurd; of which it did not require the abilities and learning of F. Paul to demonſtrate the falſehood and deſtructive tendency. It may be eaſily imagined that ſuch principles were quickly overthrown, and that no court but that of Rome thought it for its intereſt to favour them. The pope, therefore, finding his authors confuted and his cauſe abandoned, was willing to conclude the affair by treaty; which, by the mediation of Henry IV. of France, was accommodated upon terms very much to the honour of the Venetians. But the defenders of the Venetian rights, though comprehended in the treaty, were excluded by the Romans from the benefit of it: ſome, upon different pretences, were impriſoned; ſome ſent to the galleys; and all debarred from preferment. But their malice was chiefly aimed againſt F. Paul, who ſoon felt the effects of it: for as he was going one night to his convent, about ſix months after the accommodation, he was attacked by five ruffians armed with ſtilettoes, who gave him no leſs than fifteen ſtabs, three of which wounded him in ſuch a manner that he was left for dead. The murderers fled for refuge to the nuncio, and were afterwards received into the pope's dominions; but were purſued by divine juſtice, and all, except one man who died in priſon, periſhed by a violent death.

This, and other attempts upon his life, obliged him to confine himſelf to his convent, where he engaged in writing the Hiſtory of the Council of Trent; a work unequalled for the judicious diſpoſition of the matter, and artful texture of the narration; commended by Dr Burnet as the completeſt model of hiſtorical writing; and celebrated by Mr Worton as equivalent to any production of antiquity; in which the reader finds "liberty without licentiouſneſs, piety without hypocriſy, freedom of ſpeech without neglect of decency, ſeverity without rigour, and extenſive learning without oſtentation."

In this, and other works of leſs conſequence, he ſpent the remaining part of his life to the beginning of the year 1622, when he was ſeized with a cold and fever, which he neglected till it became incurable. He languiſhed more than twelve months, which he ſpent almoſt wholly in a preparation for his paſſage into eternity; and among his prayers and aſpirations was often heard to repeat, "Lord! now let thy ſervant depart in peace." On Sunday the eighth of January of the next year, he roſe, weak as he was, to maſs, and went to take his repaſt with the reſt; but on Monday was ſeized with a weakneſs that threatened immediate death; and on Thurſday prepared for his change, by receiving the viaticum, with ſuch marks of devotion as equally melted and edified the beholders. Through the whole courſe of his illneſs to the laſt hour of his life he was conſulted by the ſenate in public affairs, and returned anſwers in his greateſt weakneſs with ſuch preſence of mind as could only ariſe from the conſciouſneſs of innocence.

On Saturday, the day of his death, he had the paſſion of our bleſſed Saviour read to him out of St John's goſpel, as on every other day of that week, and ſpoke of the mercy of his Redeemer, and his confidence in his merits. As his end evidently approached, the brethren of his convent came to pronounce the laſt prayers, with which he could only join in his thoughts, being able to pronounce no more than these words, *Esto perpetua*, "Mayest thou last for ever;" which was understood to be a prayer for the proſperity of his country. Thus died F. Paul, in the 71st year of his age; hated by the Romans as their moſt formidable enemy, and honoured by all the learned for his abilities, and by the good for his integrity. His deteſtation of the corruptions of the Roman church appears in all his writings, but particularly in this memorable paſſage of one of his letters: "There is nothing more eſſential than to ruin the reputation of the Jeſuits. By the ruin of the Jeſuits, Rome will be ruined; and if Rome be ruined, religion will reform of itſelf." He appears, by many paſſages in his life, to have had a high eſteem for the church of England; and his friend F. Fulgentio, who had adopted all his notions, made no ſcruple of adminiſtering to Dr Duncombe, an Engliſh gentleman who fell ſick at Venice, the communion in both kinds, according to the Common Prayer which he had with him in Italian. F. Paul was buried with great pomp at the public charge, and a magnificent monument was erected to his memory.

Paul, in ſea language, is a ſhort bar of wood or iron, fixed cloſe to the capſtern or windlas of a ſhip, to prevent thoſe engines from rolling back or giving way when they are employed to heave in the cable, or otherwiſe charged with any great effort.

PAULIANISTS, Paulianistæ, a ſect of heretics, ſo called from their founder Paulus Samoſatenus, a native of Samoſata, elected biſhop of Antioch in 262. His doctrine ſeems to have amounted to this: that the Son and the Holy Ghoſt exiſt in God in the ſame manner as the faculties of reaſon and activity do in man; that Chriſt was born a mere man; but that the reaſon or wiſdom of the Father deſcended into him, and by him wrought miracles upon earth, and inſtructed the nations; and, finally, that on account of this union of the Divine Word with the man Jeſus, Chriſt might, though improperly, be called God. It is alſo ſaid, that he did not baptize in the name of the Father and the Son, &c.; for which reaſon the council of Nice ordered thoſe baptized by him to be re-baptized.

Being condemned by Dionyſius Alexandrinus in a council, he abjured his errors to avoid depoſition; but ſoon after he reſumed them, and was actually depoſed by another council in 269.—He may be conſidered as the father of the modern Socinians; and his errors are ſeverely condemned by the council of Nice, whoſe creed differs a little from that now uſed, under the ſame name, in the church of England. The creed agreed upon by the Nicene fathers, with a view to the errors of Paulus Samoſatenus, concludes thus: τους δε λεγοντας ην ποτε ουκ ην και πριν γεννηθηναι, ουκ ην, &c. τουτους αναθεματιζει η καθολικη και αποστολικη εκκλησια.——"But thoſe who ſay there was a time when he was not, and that he was not before he was born, the catholic and apoſtolic church anathematizes." To thoſe who have any veneration for the council of Nice this muſt appear a very ſevere, and perhaps not unjuſt, cenſure of ſome other modern ſects as well as of the Socinians.

PAULICIANS, a branch of the ancient Manichees, ſo called from their founder, one Paulus, an Armenian, in the ſeventh century; who, with his brother John, both of Samoſata, formed this ſect: though others are of opinion, that they were thus called from another Paul, an Armenian by birth, who lived under the reign of Juſtinian II. In the ſeventh century a zealot called Conſtantine revived this drooping ſect, which had ſuffered much from the violence of its adverſaries, and was ready to expire under the ſeverity of the imperial edicts, and that zeal with which they were carried into execution. The Paulicians, however, by their number, and the countenance of the emperor Nicephorus, became formidable to all the Eaſt.

But the cruel rage of perſecution, which had for ſome years been ſuſpended, broke forth with redoubled violence under the reigns of Michael Curopalates and Leo the Armenian, who inflicted capital puniſhment on ſuch of the Paulicians as refuſed to return into the boſom of the church. The empreſs Theodora, tutoreſs of the emperor Michael, in 845, would oblige them either to be converted or to quit the empire: upon which ſeveral of them were put to death, and more retired among the Saracens; but they were neither all exterminated nor baniſhed.

Upon this they entered into a league with the Saracens; and chooſing for their chief an officer of the greateſt reſolution and valour, whoſe name was Carbeus, they declared againſt the Greeks a war which was carried on for fifty years with the greateſt vehemence and fury. During theſe commotions, ſome Paulicians, towards the concluſion of this century, ſpread abroad their doctrines among the Bulgarians; many of them, either from a principle of zeal for the propagation of their opinions, or from a natural deſire of flying from the perſecution which they ſuffered under the Grecian yoke, retired, about the cloſe of the eleventh century, from Bulgaria and Thrace, and formed ſettlements in other countries. Their firſt migration was into Italy; whence, in proceſs of time, they ſent colonies into almoſt all the other provinces of Europe, and formed gradually a conſiderable number of religious aſſemblies, who adhered to their doctrine, and who were afterwards perſecuted with the utmoſt vehemence by the Roman pontiffs. In Italy they were called *Patarini*, from a certain place called *Pataria*, being a part of the city of Milan, where they held their aſſemblies; and *Gathari* or *Gazari*, from Gazaria, or the Leſſer Tartary. In France they were called *Albigenſes*, though their faith differed widely from that of the Albigenſes whom Proteſtant writers generally vindicate. (See Albigenses). The firſt religious aſſembly the Paulicians had formed in Europe is ſaid to have been diſcovered at Orleans in 1017, under the reign of Robert, when many of them were condemned to be burnt alive. The ancient Paulicians, according to Photius, expreſſed the utmoſt abhorrence of Manes and his doctrine. The Greek writers compriſe their errors under the ſix following particulars: 1. They denied that this inferior and viſible world is the production of the ſupreme Being; and they diſtinguiſh the Creator of the world and of human bodies from the moſt high God who dwells in the heavens: and hence ſome have been led to conceive that they were a branch of the Gnoſtics rather than of the Manichæans. 2. They treated contemptuouſly the Virgin Mary; or, according to the uſual manner of ſpeaking among the Greeks, they refuſed to adore and worſhip her. 3. They refuſed to celebrate the inſtitution of the Lord's Supper. 4. They loaded the croſs of Chriſt with contempt and reproach; by which we are only to underſtand, that they refuſed to follow the abſurd and ſuperſtitious practice of the Greeks, who paid to the pretended wood of the croſs a certain ſort of religious homage. 5. They rejected, after the example of the greater part of the Gnoſtics, the books of the old Teſtament; and looked upon the writers of that ſacred hiſtory as inſpired by the Creator of this world, and not by the ſupreme God. 6. They excluded preſbyters and elders from all part in the adminiſtration of the church.

PAULINA, a Roman lady, wife of Saturnius governor of Syria, in the reign of the emperor Tiberius. Her conjugal peace was diſturbed, and violence was offered to her virtue, by a young man named Mundus, who fell in love with her, and had caused her to come to the temple of Iſis by means of the prieſts of that goddeſs, who declared that Anubis wiſhed to communicate to her ſomething of moment. Saturnius complained to the emperor of the violence which had been offered to his wife; and the temple of Iſis was overturned, and Mundus baniſhed, &c.—There was beſides a *Paulina*, wife of the philoſopher Seneca. Se attempted to kill herſelf when Nero had ordered her huſband to die. The emperor, however, prevented her; and ſhe lived ſome few years after in the greateſt melancholy.

PAULINIA, a genus of plants belonging to the octandria claſs, and in the natural method ranking under the 23d order, *Trihilatæ*. See BOTANY *Index*.

PAULINUS, a biſhop who flouriſhed in the early part of the 7th century. He was the apoſtle of Yorkſhire, having been the firſt archbiſhop of York. This dignity ſeems to have been conferred on him about the year 626. He built a church at Almonbury, and dedicated it to St Alban, where he preached to and converted the Brigantes. Camden mentions a croſs at Dewsborough, which had been erected to him, with this inſcription, *Paulinus hic prædicavit et celebravit.* York was ſo ſmall about this time, that there was not ſo much as a ſmall church in it in which King Edwin could be baptized. Conſtantius is ſaid to have made it a biſhopric. Pope Honorius made it a metropolitan ſee. We are told that Paulinus baptized in the river Swale, in one day, 10,000 men, beſides women and children, on the firſt converſion of the Saxons to Chriſtianity, beſides many at Halyſtone. At Walſtone, in Northumberland, he baptized Segbert king of the Eaſt Saxons. Bede ſays, "Paulinus coming with the king and queen to the royal manor called *Ad Gebrin* (now Yeverin), ſtaid there 36 days with them, employed in the duties of catechizing and baptizing. In all this time he did nothing from morning to night but inſtruct the people, who flocked to him from all the villages and places, in the doctrine of Chriſt and ſalvation; and, after they were inſtructed, baptizing them in the neighbouring river Glen." According to the ſame Bede, "he preached the word in the province of Lindiſſi; and firſt converted the governor of the city of Lindocollina, whoſe name was Blecca, with all his family. In this city he built a ſtone church of exquiſite workmanſhip, whoſe roof being ruined by long neglect or the violence of the enemy, only the walls are now ſtanding." He is alſo ſaid to have founded a collegiate church of prebends near Southwell, in Nottinghamſhire, dedicated to the Virgin Mary. This church he is ſaid to have built when he baptized the Coritani in the Trent.

PAULO, Marco, a celebrated traveller, was ſon to Nicholas Paulo, a Venetian, who went with his brother Matthew, about the year 1255, to Conſtantinople, in the reign of Baudoin II. Nicholas, at his departure, left his wife big with child; and ſhe brought to the world the famous Marco Paulo, the ſubject of this memoir. The two Venetians, having taken leave of the emperor, croſſed the Black ſea, and travelled into Armenia; whence they paſſed over land to the court of Barka, one of the greateſt lords of Tartary, who loaded them with honours. This prince having been defeated by one of his neighbours, Nicholas and Matthew made the beſt of their way through the deſerts, and arrived at the city where Kublai, grand khan of the Tartars, reſided. Kublai was entertained with the account which they gave him of the European manners and cuſtoms; and appointed them ambaſſadors to the pope, in order to demand of his holineſs a hundred miſſionaries. They came accordingly to Italy, obtained from the Roman pontiff two Dominicans, the one an Italian, the other an Aſiatic, and carried along with them young Marco, for whom Kublai expreſſed a ſingular affection. This young man, having learned the different dialects of Tartary, was employed in embaſſies which gave him the opportunity of traverſing Tartary, China, and other eaſtern countries. At length, after a reſidence of ſeventeen years at the court of the grand khan, the three Venetians returned to their own country, in the year 1295, with immenſe fortunes. A ſhort time after his return, Marco ſerving his country at ſea againſt the Genoeſe, his galley, in a great naval engagement, was ſunk, and himſelf taken priſoner, and carried to Genoa. He remained there many years in confinement; and, as well to amuſe his melancholy as to gratify thoſe who deſired it from him, he ſent for his notes from Venice, and compoſed the hiſtory of his own and his father's voyages in Italian, under this title, *Delle maraviglie del mondo da lui vidute*, &c.; the firſt edition of which appeared at Venice, in 8vo, 1496. His work was tranſlated into different languages, and inſerted in various collections. The editions moſt eſteemed are the Latin one publiſhed by Andrew Muller at Cologne, in 4to, 1671; and that in French, to be found in the collection of voyages publiſhed by Bergeron, at the Hague, 1735, in 2 vols 4to. In the writings of Marco Paulo, there are ſome things true and others highly incredible. It is indeed difficult to believe, that as ſoon as the grand khan was informed of the arrival of two Venetian merchants, who were come to ſell theriaca (or treacle) at his court, he ſent before them an eſcort of 40,000 men, and afterwards diſpatched theſe Venetians ambaſſadors to the Pope, to beſeech his holineſs to ſend him a hundred miſſionaries. It is equally difficult to believe that the pope, who doubtleſs had an ardent zeal for the propagation of the faith, inſtead of a hundred, ſhould have ſent him only two miſſionaries. There are therefore ſome errors and exaggerations in Marco Paulo's narrative; but many other things which were afterwards verified, and which have been of ſervice to ſucceeding travellers, prove that in ſeveral reſpects his relation is valuable. He not only gave better accounts of China than had been before received; but likewiſe furniſhed a deſcription of Japan, of many of the iſlands of the Eaſt Indies, of Madagaſcar, and the coaſts of Africa; ſo that from his work it might be eaſily collected, that a direct paſſage by ſea to the Indies was not only poſſible, but practicable. It may be worth while to add, that, in the opinion of the authors of the Univerſal Hiſtory, what he wrote from his own knowledge is both curious and true, ſo that where he has erred his father and uncle muſt have deceived him.

PAULUS ÆMILIUS. See *ÆMILIUS Paulus*.

PAVO, the PEACOCK; a genus of birds belonging to the order of gallinæ. See ORNITHOLOGY *Index*.

PAVO, in *Aſtronomy*, a conſtellation in the ſouthern hemiſphere, unknown to the ancients, and not viſible in our latitude. It conſiſts of 14 ſtars, of which the names and ſituations are as follows:

	Signs.	Longitude °	′	″	Latitude South. °	′	″	Magnitude.
The eye of the peacock	♑	20	0	3	36	11	18	2
In the breaſt		24	41	51	46	56	21	3
In the right wing		18	41	38	45	52	34	3
In the middle		3	42	26	44	29	8	3
In the root of the tail, firſt		3	53	21	44	6	13	5
5.								
ſecond		2	42	11	41	37	9	5
third		3	55	22	39	3	2	4
fourth		5	11	3	37	10	46	6
fifth		0	49	34	38	54	14	5
ſixth	♐	29	39	17	38	3	36	4
10.								
ſeventh		27	22	54	40	9	28	5
laſt		24	7	44	41	28	2	4
In the right foot	♑	1	22	11	48	6	3	4
In the left foot		9	43	7	50	49	7	4

See ASTRONOMY.

PAVOR, a Roman deity, whoſe worſhip was introduced by Tullus Hoſtilius, who, in a panic, vowed a ſhrine to him, and one to Pallor, *Paleneſs*; and therefore they are found on the coins of that family.

PAUSANIA, in Grecian antiquity, a feſtival in which were ſolemn games, wherein nobody contended but free-born Spartans; in honour of Pauſanias the Spartan general, under whom the Greeks overcame the Perſians in the famous battle of Platæa.

PAUSANIAS, a Spartan king and general, who ſignalized himſelf at the battle of Platæa againſt the Perſians. The Greeks, very ſenſible of his ſervices, rewarded his merit with a tenth of the ſpoils taken from the Perſians. He was afterwards appointed to command the Spartan armies, and he extended his conqueſts in Aſia; but the haughtineſs of his behaviour created him many enemies; and the Athenians ſoon obtained a ſuperiority in the affairs of Greece.—Pauſanias, diſſatisfied with his countrymen, offered to betray Greece to the Perſians, if he received in marriage as the reward of his perfidy the daughter of their king. His intrigues were diſcovered by means of a young man who was intruſted with his letters to Perſia, and who refuſed to go, on recollecting that ſuch as had been employed in that office before had never returned. The letters were given to the Ephori of Sparta, and the perfidy of Pauſanias was thus diſcovered. He fled for ſafety to a temple of Minerva; and as the ſanctity of the place ſcreened him from the violence of his purſuers, the ſacred building was ſurrounded with heaps of ſtones, the firſt of which was carried there by the indignant mother of the unhappy man. He was ſtarved to death in the temple, and died about 474 years before the Chriſtian era. There was a feſtival and ſolemn games inſtituted to his honour, in which only free-born Spartans contended. There was alſo an oration ſpoken in his praiſe, in which his actions were celebrated, particularly the battle of Platæa, and the defeat of Mardonius. See PAUSANIA.

PAUSANIAS, a learned Greek hiſtorian and orator, in the ſecond century, under the reign of Antoninus the Philoſopher, was the diſciple of Herodus Atticus. He lived for a long time in Greece; and afterwards went to Rome, where he died at a great age. He wrote an excellent deſcription of Greece, in ten books; in which we find not only the ſituation of places, but the antiquities of Greece, and every thing moſt curious and worthy of knowledge. Abbe Gedoin has given a French tranſlation of it, in 2 vols 4to.

PAUSE, a ſtop or ceſſation in ſpeaking, ſinging, playing, or the like. One uſe of pointing in grammar is to make proper pauſes, in certain places.—There is a pauſe in the middle of each verſe; in an hemiſtich, it is called a *reſt* or *repoſe*. See POETRY, and READING.

PAW, in the manege. A horſe is ſaid to paw the ground, when, his leg being either tired or painful, he does not reſt it upon the ground, and fears to hurt himſelf as he walks.

PAWN, a pledge or gage for ſurety of payment of money lent. It is ſaid to be derived *à pugno, quia res quæ pignori dantur, pugno vel manu traduntur*. The party that pawns goods hath a general property in them; they cannot be forfeited by the party that hath them in pawn for any offence of his, nor be taken in execution for his debt; neither may they otherwiſe be put in execution till the debt for which they are pawned is ſatisfied.

If the pawn is laid up, and the pawnee robbed, he is not anſwerable; though if the pawnee uſe the thing, as a jewel, watch, &c. that will not be the worſe for wearing, which he may do, it is at his peril; and if he is robbed, he is anſwerable to the owner, as the uſing occaſioned the loſs, &c.

If the pawn is of ſuch a nature that the keeping is a charge to the pawnee, as a cow or a horſe, &c. he may milk the one and ride the other, and this ſhall go in recompence for his keeping.

Things which will grow the worſe by uſing, as apparel, &c. he may not uſe.

PEA, in *Botany*. See PISUM.

PEACE, TEMPLE OF, a celebrated temple at Rome, which was conſumed by fire A. D. 191; produced, as ſome writers ſuppoſe, by a ſlight earthquake, for no thunder was heard at the time. Dio Caſſius, however, ſuppoſes that it began in the adjoining houſes. Be that as it will, the temple, with all the ſurrounding buildings, was reduced to aſhes. That magnificent ſtructure had been raiſed by Veſpaſian after the deſtruction of Jeruſalem, and enriched with the ſpoils and ornaments of the temple of the Jews. The ancients ſpeak of it as one of the moſt ſtately buildings in Rome. There men of learning uſed to hold their aſſemblies, and lodge their writings, as many others depoſited their jewels, and whatever elſe they eſteemed of great value. It was likewiſe made uſe of as a kind of magazine for the ſpices that were brought by the Roman merchants out of Egypt and Arabia; ſo that many rich perſons were reduced to beggary, all their valuable effects and treaſures being conſumed in one night, with the temple.

PEACH. See Amygdalus, Botany and Gardening *Index*.

PEACOCK. See Pavo, Ornithology *Index*.

PEAK of Derbyshire, a chain of very high mountains in the county of Derby in England, famous for the mines they contain, and for their remarkable caverns. The moſt remarkable of theſe are Pool's-hole and Elden-hole. The former is a cave at the foot of a high hill called *Coitmoſs*, ſo narrow at the entrance that paſſengers are obliged to creep on all fours; but it ſoon opens to a conſiderable height, extending to above a quarter of a mile, with a roof ſomewhat reſembling that of an ancient cathedral. By the petrifying water continually dropping in many parts of the cave are formed a variety of curious figures and repreſentations of the works both of nature and art. There is a column here as clear as alabaſter, which is called *The Queen of Scots' Pillar*, becauſe Queen Mary is ſaid to have proceeded thus far when ſhe viſited the cavern. It ſeems the curioſity of that princeſs had led her thus far into this dark abode; and indeed there are few travellers who care to venture farther; but others, determined to ſee the end of all, have gone beyond it. After ſliding down the rock a little way, is found the dreary cavity turned upwards: following its courſe, and climbing from crag to crag, the traveller arrives at a great height, till the rock, cloſing over his head on all ſides, puts an end to any farther ſubterraneous journey. Juſt at turning to deſcend, the attention is caught by chaſm, in which is ſeen a candle glimmering at a vaſt depth underneath. The guides ſay, that the light is at a place near Mary Queen of Scots' pillar, and no leſs than 80 yards below. It appears frightfully deep indeed to look down; but, perhaps does not meaſure any thing like what it is ſaid to do. If a piſtol is fired by the Queen of Scots' pillar, it will make a report as loud as a cannon. Near the extremity there is a hollow in the roof, called the *Needle's Eye;* in which if a candle is placed, it will repreſent a ſtar in the firmament to thoſe who are below. At a little diſtance from this cave is a ſmall clear ſtream conſiſting of hot and cold water, ſo near each other, that the finger and thumb of the ſame hand may be put, the one into the hot water and the other into the cold.

Elden-hole is a dreadful chaſm in the ſide of a mountain; which, before the latter part of the laſt century, was thought to be altogether unfathomable. In the time of Queen Elizabeth, a poor man was let down into it for 200 yards; but he was drawn up in a frenzy, and ſoon after died. In 1682, it was examined by Captain Collins, and in 1699 by Captain Sturmy, who publiſhed their accounts in the Philoſophical Tranſactions. The latter deſcended by ropes fixed at the top of an old lead-ore pit, four fathoms almoſt perpendicular, and from thence three fathoms more obliquely, between two great rocks. At the bottom of this he found an entrance into a very ſpacious cavern, from whence he deſcended along with a miner for 25 fathoms perpendicular. At laſt they came to a great river or water, which he found to be 20 fathoms broad and eight fathoms deep. The miner who accompanied him, inſiſted that this water ebbed and flowed with the ſea; but the Captain diſproved this aſſertion, by remaining in the place from three hours flood to two hours ebb, during which time there was no alteration in the height of the water. As they walked by the ſide of the water, they obſerved a hollow in the rock ſome feet above them. The miner went into this place, which was the mouth of another cavern; and walked for about 70 paces in it, till he had loſt ſight of the Captain. He then called to him, that he had found a rich mine; but immediately after came running out and crying, that he had ſeen an evil ſpirit; neither could any perſuaſions induce him to return. The floor of theſe caverns is a kind of white ſtone enamelled with lead ore, and the roofs are encruſted with ſhining ſpar. On his return from this ſubterraneous journey, Captain Sturmy was ſeized with a violent headach, which, after continuing four days, terminated in a fever, of which he died in a ſhort time.

Peak of Teneriff. See Teneriffe.

PEAN, in heraldry, is when the field of a coat of arms is ſable, and the powderings or.

PEAR, See Pyrus, Botany and Gardening *Index*.

Pear-Glaſs. See *Vitreæ Lacrymæ*.

PEARCE, Dr, lord biſhop of Rocheſter, was the ſon of a diſtiller in High Holborn. He married Miſs Adams, the daughter of a diſtiller in the ſame neighbourhood, with a conſiderable fortune, who lived with him 52 years in the higheſt degree of connubial happineſs. He had his education in Weſtminſter ſchool, where he was diſtinguiſhed by his merit, and elected one of the king's ſcholars. In 1710, when he was 20 years old, he was elected to Trinity College, Cambridge. During the firſt years of his reſidence at the univerſity, he ſometimes amuſed himſelf with lighter compoſitions, ſome of which are inſerted in the Guardian and Spectator. In 1716, he publiſhed his edition of *Cicero de Oratore*, and, at the deſire of a friend, luckily dedicated it to Lord Chief Juſtice Parker (afterwards Earl of Macclesfield), to whom he was a ſtranger. This incident laid the foundation of his future fortune: for Lord Parker ſoon recommended him to Dr Bentley, maſter of Trinity, to be made one of the fellows; and the doctor conſented to it on this condition, that his lordſhip would promiſe to remove him again as ſoon as it was in his power to give him a living. In 1717, Mr Pearce was ordained at the age of 27; having taken time enough, as he thought, to attain a ſufficient knowledge of the ſacred office. In 1718, Lord Parker was appointed chancellor, and invited Mr Pearce to live with him in his houſe as chaplain. In 1719, he was inſtituted into the rectory of Stapleford Abbots, in Eſſex, and in 1720 into that of St Bartholomew, behind the Royal Exchange, worth 200 l. *per annum*. In 1723, the lord chancellor preſented him to St Martin's in the Fields. His Majeſty, who was then at Hanover, had engaged himſelf in favour of Dr Clagget, who was then chaplain to him; and the doctor actually kiſſed hands upon the occaſion; but the chancellor, upon the king's return, ob-

tained

Pearce. puted the point, and was permitted to preſent Mr Pearce.—Mr Pearce ſoon attracted the notice and eſteem of perſons in the higheſt ſtations and of the greateſt abilities. Beſide Lord Parker, he could reckon amongſt his patrons or friends, Lord Macclesfield, Mr Pulteney (afterwards Earl of Bath), Archbiſhop Potter, Lord Hardwicke, Sir Iſaac Newton, and other illuſtrious perſonages.—In 1724, the degree of doctor of divinity was conferred on him by Archbiſhop Wake. The ſame year he dedicated to his patron, the earl of Macclesfield, his edition of *Longinus on the Sublime*, with a new Latin verſion and notes.

When the church of St Martin's was rebuilt, Dr Pearce preached a ſermon at the conſecration, which he afterwards printed, and accompanied with an eſſay on the origin and progreſs of temples, traced from the rude ſtones which were firſt uſed for altars to the noble ſtructure of Solomon, which he conſiders as the firſt temple completely covered. His obſervations on that building which is called the *Temple of Dagon* removes part of the difficulty which preſents itſelf in the narration of the manner in which Samſon deſtroyed it.

The deanery of Wincheſter becoming vacant, Dr Pearce was appointed dean in 1739; and in the year 1744 he was elected prolocutor of the lower houſe of convocation for the province of Canterbury. His friends now began to think of him for the epiſcopal dignity; but Mr Dean's language rather declined it. However, after ſeveral difficulties had been ſtarted and removed, he conſented to accept the biſhopric of Bangor, and promiſed Lord Hardwicke to do it with a good grace. He accordingly made proper acknowledgments of the royal goodneſs, and was conſecrated Feb. 12. 1748. Upon the declining ſtate of health of Dr Wilcocks, biſhop of Rocheſter, the biſhop of Bangor was ſeveral times applied to by Archbiſhop Herring to accept of Rocheſter, and the deanery of Weſtminſter, in exchange for Bangor; but the biſhop then firſt ſignified his deſire to obtain leave to reſign and retire to a private life. His lordſhip, however, upon being preſſed, ſuffered himſelf to be prevailed upon.—"My Lord (ſaid he to the duke of Newcaſtle), your grace offers theſe dignities to me in ſo generous and friendly a manner, that I promiſe you to accept them." Upon the death of Biſhop Wilcocks he was accordingly promoted to the ſee of Rocheſter and deanery of Weſtminſter in 1756. Biſhop Sherlock died in 1761, and Lord Bath offered his intereſt for getting the biſhop of Rocheſter appointed to ſucceed him in the dioceſe of London; but the biſhop told his lordſhip, that he had determined never to be biſhop of London or archbiſhop of Canterbury.

In the year 1763, his lordſhip being 73 years old, and finding himſelf leſs fit for the buſineſs of his ſtations as biſhop and dean, informed his friend Lord Bath of his intention to reſign both, and live in a retired manner upon his private fortune. Lord Bath undertook to acquaint his majeſty; who named a day and hour, when the biſhop was admitted alone into the cloſet. He told the king, that he wiſhed to have ſome interval between the fatigues of buſineſs and eternity; and deſired his majeſty to conſult proper perſons about the propriety and legality of his reſignation. In about two months the king informed him, that Lord Mansfield ſaw no objection; and that Lord Northington, who had been doubtful, on farther conſideration thought that the requeſt might be complied with. Unfortunately for the biſhop, Lord Bath applied for Biſhop Newton to ſucceed. This alarmed the miniſtry, who thought that no dignities ſhould be obtained but through their hands. They therefore oppoſed the reſignation; and his majeſty was informed that the biſhops diſliked the deſign. His majeſty ſent to him again; and at a third audience told him, that he muſt think no more of reſigning. The biſhop replied, "Sire, I am all duty and ſubmiſſion;" and then retired.

In 1768 he obtained leave to reſign the deanery; in 1773, he loſt his lady; and after ſome months of lingering decay, he died at Little Ealing, June 29. 1774.

This eminent prelate diſtinguiſhed himſelf in every part of his life by the virtues proper to his ſtation. His literary abilities, and application to ſacred and philological learning, appear by his works; the principal of which are, A letter to the clergy of the church of England, on occaſion of the biſhop of Rocheſter's commitment to the Tower, 2d edit. 1722. Miracles of Jeſus vindicated, 1727 and 1728. A review of the text of Milton, 1733. Two letters againſt Dr Middleton, occaſioned by the doctor's letter to Waterland, on the publication of his treatiſe, intitled, *Scripture Vindicated*, 3d edit. 1752. And ſince his death, a commentary with notes on the four Evangeliſts and the Acts of the Apoſtles, together with a new tranſlation of St Paul's firſt Epiſtle to the Corinthians, with a paraphraſe and notes, have been publiſhed, with his life prefixed, from original MSS. in 2 vols. 4to.

The following character of this excellent biſhop was publiſhed in the Gentleman's Magazine for 1775, and was written, as we are told, by a contemporary and friend. "The world has not loſt for many years a more reſpectable member of ſociety than the late Dr Pearce; nor the clergy a more pious and learned prelate. In his younger days, before he became a graduate, he publiſhed that excellent edition of Longinus, ſtill admired and quoted by the beſt critics. What is ſaid of Longinus himſelf by our excellent Engliſh poet, is as applicable to the editor: 'He is himſelf the great ſublime he draws;' for very few of his order ever arrived at that perfection in eloquence, for which he was ſo juſtly celebrated. His diction was ſimple, nervous, and flowing; his ſentiments were juſt and ſublime; more ſublime than the heathen critic, in proportion to the ſuperior ſublimity of the Chriſtian revelation. Yet he was never puffed up with the general applauſes of the world, but of an humble deportment, reſembling the meek Jeſus as far as the weakneſs of human nature can reſemble a character without ſin. His countenance was always placid, and diſplayed the benevolence of his heart, if his extenſive charity had not proved it to a demonſtration. His thirſt of knowledge prompted him to a very ſtudious life, and that rendered both his complexion and conſtitution delicate; yet it held out by the bleſſing of Providence be-beyond the 85th year of his age; which is the more extraordinary, conſidering the midnight lamp had caſt a paleneſs over his complexion: yet with all his learning and knowledge, his humility and modeſty reſtrained him from many publications, which the world may hope for from his executors; one particularly in divinity, which has been the object of his contemplation for many years paſt.

Pearch, Pearl.

part. With a view to complete that work, and to retire from the buſtle of the world, he ſtruggled ſo hard to reſign his biſhopric, &c. After poſſeſſing the eſteem and veneration of all who knew him for a long ſeries of years, either as rector of a very large pariſh, or as a dignitary of the church, he has left the world in tears; and gone to receive the infinite reward of his piety and virtue."

PEARCH. See PERCA, ICHTHYOLOGY *Index*.

PEARCH-Glue, the name of a kind of glue, of remarkable ſtrength and purity, made from the ſkins of pearches.

PEARL, in *Natural Hiſtory*, a hard, white, ſhining body, uſually roundiſh, found in a teſtaceous fiſh, a ſpecies of *Mya*; which ſee, CONCHOLOGY *Index*.

Pearls, though eſteemed of the number of gems and highly valued in all ages, proceed only from a diſtemper in the animal that produces them, analogous to the bezoars and other ſtony concretions in ſeveral animals of other kinds. For an account of the mode of formation of the pearl, ſee CONCHOLOGY, p. 476; for the hiſtory of the pearl fiſhery in the bay of Condatchy in Ceylon, ſee CEYLON, p. 363; ſee alſo Cordiner's Hiſtory of that iſland, 4to.

Mr Bruce mentions a muſcle found in the ſalt ſprings of the Nubian deſert; in many of which he found thoſe excreſcences which might be called pearls, but all of them ill formed, foul, and of a bad colour, though of the ſame conſiſtence, and lodged in the ſame part of the body as thoſe in the ſea. "The muſcle, too (ſays our author), is in every reſpect ſimilar, I think larger. The outer ſkin or covering of it is of a vivid green. Upon removing this, which is the epidermis, what next appears is a beautiful pink without gloſs, and ſeemingly of a calcareous nature. Below this, the mother-of-pearl, which is undermoſt, is a white without luſtre, partaking much of the blue and very little of the red; and this is all the difference I obſerved between it and the pearl-bearing muſcle of the Red ſea."

"In Scotland, eſpecially to the northward, in all rivers running from lakes, there are found muſcles that have pearls of more than ordinary merit, though ſeldom of large ſize. They were formerly tolerably cheap, but lately the wearing of real pearls coming into faſhion, thoſe of Scotland have increaſed in price greatly beyond their value, and ſuperior often to the price of oriental ones when bought in the eaſt. The reaſon of this is a demand from London, where they are actually employed in work, and ſold as oriental. But the excellency of all glaſs or paſte manufactory, it is likely, will keep the price of this article, and the demand for it, within bounds, when every lady has it in her power to wear in her ears, for the price of ſixpence, a pearl as beautiful in colour, more elegant in form, lighter and eaſier to carry, and as much bigger as ſhe pleaſes, than the famous ones of Cleopatra and Servilia. In Scotland, as well as in the eaſt, the ſmooth and perfect ſhell rarely produces a pearl; the crooked and diſtorted ſhell ſeldom wants one.

The mother-of-pearl manufactory is brought to the greateſt perfection at Jeruſalem. The moſt beautiful ſhell of this kind is that of the peninim already mentioned; but it is too brittle to be employed in any large pieces of workmanſhip; whence that kind named *dora* is moſt uſually employed; and great quantities of this are daily brought from the Red ſea to Jeruſalem. Of theſe, all the fine works, the crucifixes, the wafer-boxes, and the beads, are made, which are ſent to the Spaniſh dominions in the New World, and produce a return incomparably greater than the ſtaple of the greateſt manufactory in the Old.

Pearl.

"Very little is known of the natural hiſtory of the pearl fiſh. Mr Bruce ſays, that, as far as he has obſerved, they are all ſtuck upright in the mud by an extremity; the muſcle by one end, the ſecond by the ſmall ſharp point, and the third by the hinge or ſquare part which projects from the round. "In ſhallow and clear ſtreams (ſays Mr Bruce), I have ſeen ſmall furrows or tracks upon the ſandy bottom, by which you could trace the muſcle from its laſt ſtation; and theſe not ſtraight, but deviating into traverſes and triangles, like the courſe of a ſhip in a contrary wind laid down upon a map, probably in purſuit of food. The general belief is, that the muſcle is conſtantly ſtationary in a ſtate of repoſe, and cannot transfer itſelf from place to place. This is a vulgar prejudice, and one of thoſe facts that are miſtaken for want of ſufficient pains or opportunity to make more critical obſervations. Others, finding the firſt opinion a falſe one, and that they are endowed with power of changing place like other animals, have, upon the ſame foundation, gone into the contrary extreme, ſo far as to attribute ſwiftneſs to them, a property ſurely inconſiſtent with their being fixed to rocks. Pliny and Solinus ſay that the muſcles have leaders, and go in flocks; and that their leader is endowed with great cunning to protect himſelf and his flock from the fiſhers; and that, when he is taken, the others fall an eaſy prey. This, however, we may juſtly look upon to be a fable; ſome of the moſt accurate obſervers having diſcovered the motion of the muſcle, which indeed is wonderful, and that they lie in beds, which is not at all ſo, have added the reſt, to make their hiſtory complete." Our author informs us, that the muſcles found in the ſalt ſprings of Nubia likewiſe travel far from home, and are ſometimes ſurpriſed, by the ceaſing of the rains, at a greater diſtance from their beds than they have ſtrength and moiſture to carry them. He aſſures us, that none of the pearl-fiſh are eatable; and that they are the only fiſh he ſaw in the Red ſea that cannot be eaten.

Artificial PEARLS. Attempts have been made to take out ſtains from pearls, and to render the foul opaque-coloured ones equal in luſtre to the oriental. Numerous proceſſes are given for this purpoſe in books of ſecrets and travels; but they are very far from anſwering what is expected from them. Pearls may be cleaned indeed from any external foulneſſes by waſhing and rubbing them with a little Venice ſoap and warm water, or with ground rice and ſalt, with ſtarch and powder blue, plaſter of paris, coral, white vitriol and tartar, cuttle-bone, pumice-ſtone, and other ſimilar ſubſtances; but a ſtain that reaches deep into the ſubſtance of pearls is impoſſible to be taken out. Nor can a number of ſmall pearls be united into a maſs ſimilar to an entire natural one, as ſome pretend.

There are, however, methods of making artificial pearls, in ſuch manner as to be with difficulty diſtinguiſhed from the beſt oriental. The ingredient uſed for this purpoſe was long kept a ſecret; but it is now diſcovered to be a fine ſilver-like ſubſtance found upon the under ſide of the ſcales of the blay or bleak fiſh. The ſcales, taken off in the uſual manner, are waſhed and

rubbed

rinſed with freſh parcels of fair water, and the ſeveral liquors ſuffered to ſettle: the water being then poured off, the pearly matter remains at the bottom, of the conſiſtence of oil, called by the French *eſſence d'orient*. A little of this is dropped into a hollow bead of bluiſh glaſs, and ſhaken about ſo as to line the internal ſurface; after which the cavity is filled up with wax, to give ſolidity and weight. Pearls made in this manner are diſtinguiſhable from the natural only by their having fewer blemiſhes.

Mother of PEARL, the ſhell, not of the pearl oyſter, but of the *mytilus margaritiferus*. See MYTILUS, CONCHOLOGY *Index*.

PEARL-aſh, a fixed alkaline ſalt, prepared chiefly in Germany, Ruſſia, and Poland, by melting the ſalts out of the aſhes of burnt wood; and having reduced them again to dryneſs, evaporating the moiſture, and calcining them for a conſiderable time in a furnace moderately hot. The goodneſs of pearl-aſhes muſt be diſtinguiſhed by a uniform and white appearance: they are nevertheleſs ſubject to a common adulteration, not eaſy to be diſtinguiſhed by the mere appearance, which is done by the addition of common ſalt. In order to find out this fraud, take a ſmall quantity of the ſuſpected ſalt; and after it has been ſoftened by lying in the air, put it over the fire in a ſhovel: if it contains any common ſalt, a crackling and ſlight exploſion will take place as the ſalt grows hot.

Pearl-aſhes are much uſed in the manufacture of glaſs, and require no preparation, except where very great tranſparency is required, as in the caſe of looking glaſs, and the beſt kind of window glaſs. For this purpoſe diſſolve them in four times their weight of boiling water: when they are diſſolved, let the ſolution be put into a clean tub, and ſuffered to remain there 24 hours or more. Let the clear part of the fluid be then decanted off from the ſediment, and put back into the iron pot in which the ſolution was made; in this let the water be evaporated till the ſalts be left perfectly dry. Keep thoſe that are not deſigned for immediate uſe in ſtone jars, well ſecured from moiſture and air.

Mr Kirwan, who inſtituted a ſet of experiments on the alkaline ſubſtances uſed in bleaching, &c. (ſee *Iriſh Tranſact.* for 1789), tells us, that in 100 parts of the Dantzick pearl-aſh, the vegetable alkali amounted to ſomewhat above 63. His pearl-aſh he prepares by calcining a ley of vegetable aſhes dried into a ſalt to whiteneſs. In this operation, he ſays, "particular care ſhould be taken that it ſhould not melt, as the extractive matter would not be thoroughly conſumed, and the alkali would form ſuch a union with the earthy parts as could not eaſily be diſſolved." He has "added this caution, as Dr Lewis and Mr Doſſie have inadvertently directed the contrary." We apprehend, however, that here is a little inaccuracy; and that it was not for pearl-aſh, but for the unrefined pot-aſh, that theſe gentlemen directed fuſion. The fact is, that the American pot-aſhes, examined by them, had unqueſtionably ſuffered fuſion; which was effected in the ſame iron pot in which the evaporation was finiſhed, by rather increaſing the fire at the end of the proceſs: by this management, one of the moſt troubleſome operations in the whole manufacture, the ſeparation of the hard ſalt from the veſſels with hammers and chiſſels, was avoided; and though the extractive matter was not conſumed, it was burnt to an indiſſoluble coal; ſo that the ſalt, though black itſelf, produced a pale or colourleſs ſolution, and was uncommonly ſtrong. Mr Kirwan has alſo given tables of the quantities of aſhes and ſalt obtained from different vegetables; and he concludes from them, 1. "That in general weeds yield much more aſhes, and their aſhes much more ſalt, than woods; and that, conſequently, as to ſalts of the vegetable alkali kind, neither America, Trieſte, nor the northern countries, poſſeſs any advantage over us. 2. That of all weeds, fumitory produces moſt ſalt, and next to it wormwood; but if we attend only to the quantity of ſalt in a given weight of aſhes, the aſhes of wormwood contain moſt. *Trifolium fibrinum* alſo produces more aſhes and ſalt than fern." See POTASH.

PEARSON, JOHN, a very learned Engliſh biſhop in the 17th century, was born at Snoring in 1613. After his education at Eton and Cambridge, he entered into holy orders in 1630, and was the ſame year collated to the prebend of Netherhaven in the church of Sarum. In 1640 he was appointed chaplain to the lord keeper Finch, and by him preſented to the living of Torrington in Suffolk. In 1650 he was made miniſter of St Clement's, Eaſt-Cheap, in London. In 1657, he and Mr Gunning had a diſpute with two Roman Catholics upon the ſubject of ſchiſm; a very unfair account of which was printed at Paris in 1658. Some time after, he publiſhed at London An Expoſition of the Creed, in folio, dedicated to his pariſhioners of St Clement's Eaſt-Cheap, to whom the ſubſtance of that excellent work had been preached ſeveral years before, and by whom he had been deſired to make it public. The ſame year he likewiſe publiſhed The Golden Remains of the ever memorable Mr John Hales of Eton; to which he prefixed a preface, containing, of that great man, with whom he had been acquainted for many years, a character drawn with great elegance and force. Soon after the Reſteration, he was preſented by Juxon, then biſhop of London, to the rectory of St Chriſtopher's in that city; created doctor of divinity at Cambridge, in purſuance of the king's letters mandatory; inſtalled prebendary of Ely, archdeacon of Surry; and made maſter of Jeſus college in Cambridge: all before the end of the year 1668. March 25th 1661, he was appointed Margaret profeſſor of divinity in that univerſity; and, the firſt day of the enſuing year, was nominated one of the commiſſioners for the review of the liturgy in the conference at the Savoy. April 14th 1662, he was admitted maſter of Trinity college in Cambridge; and, in Auguſt, reſigned his rectory of St Chriſtopher's and prebend of Sarum.—In 1667 he was admitted a Fellow of the Royal Society. In 1672 he publiſhed at Cambridge, in 4to, *Vindiciæ Epiſtolarum S. Ignatii*, in anſwer to Monſ. Daillé; to which is ſubjoined, *Iſaaci Voſſii epiſtolæ duæ adverſus Davidem Blondellum*. Upon the death of the celebrated Wilkins, Pearſon was appointed his ſucceſſor in the ſee of Cheſter, to which he was conſecrated February 9th 1672-3. In 1682, his *Annales Cyprianici, ſive tredecim annorum, quibus S. Cyprian. inter Chriſtianos verſatus eſt, hiſtoria chronologica*, was publiſhed at Oxford, with Fell's edition of that Father's works. Pearſon was diſabled from all public ſervice by ill health a conſiderable time before his death, which happened at Cheſter, July 16th 1686.

PEASANT, a hind, one whoſe buſineſs is in rural labour.

It is amongſt this order of men that a philoſopher would look for innocent and ingenuous manners. The ſituation of the peaſantry is ſuch as ſecludes them from the devaſtations of luxury and licentiouſneſs; for when the contagion has once reached the receſſes of rural retirement, and corrupted the minds of habitual innocence, that nation has reached the ſummit of vice, and is haſtening to that decay which has always been the effect of vicious indulgence. The peaſantry of this country ſtill in a great meaſure retain that ſimplicity of manners and ruſtic innocence which ought to be the characteriſtic of this order of ſociety; and, in many parts, their condition is ſuch as, were all its advantages ſufficiently known, would create envy in the minds of thoſe who have toiled through life, amidſt the buſtle of the world, in queſt of that happineſs which it could not confer.

> *O fortunatos nimium, ſua ſi bona norint,*
> *Agricolas.*—— VIRGIL.

In other countries the peaſants do not enjoy the ſame liberty as they do in our own, and are conſequently not ſo happy. In all feudal governments they are abject ſlaves, entirely at the diſpoſal of ſome petty deſpot. This was the caſe in Poland, where the native peaſants were ſubject to the moſt horrid ſlavery, though thoſe deſcended of the Germans, who ſettled in Poland during the reign of Boleſlaus the Chaſte and Caſſimir the Great, enjoyed very diſtinguiſhed privileges. Amongſt the native ſlaves, too, thoſe of the crown were in a better condition than thoſe of individuals. See POLAND.

e's Tra- 's into land, ſia, eden, l Den- rk.

The peaſants of Ruſſia (Mr Coxe tells us) are a hardy race of men, and of great bodily ſtrength. Their cottages are conſtructed with tolerable propriety, after the manner of thoſe in Lithuania; but they are very poorly furniſhed. The peaſants are greedy of money, and, as the ſame author informs us, ſomewhat inclined to thieving. They afford horſes to travellers, and act the part of coachmen and poſtilions. "In their common intercourſe they are remarkably polite to each other: they take off their cap at meeting; bow ceremoniouſly and frequently, and uſually exchange a ſalute. They accompany their ordinary diſcourſe with much action, and innumerable geſtures; and are exceedingly ſervile in their expreſſions of deference to their ſuperiors: in accoſting a perſon of conſequence, they proſtrate themſelves, and even touch the ground with their heads. We were often ſtruck at receiving this kind of eaſtern homage, not only from beggars, but frequently from children, and occaſionally from ſome of the peaſants themſelves.

"The peaſants are well clothed, comfortably lodged, and ſeem to enjoy plenty of wholeſome food. Their rye-bread, whoſe blackneſs at firſt diſguſts the eye, and whoſe ſourneſs the taſte, of a delicate traveller, agrees very well with the appetite: as I became reconciled to it from uſe, I found it at all times no unpleaſant morſel, and, when ſeaſoned with hunger, it was quite delicious: they render this bread more palatable, by ſtuffing it with onions and groats, carrots or green corn, and ſeaſoning it with ſweet oil. The rye-bread is ſometimes white, and their other articles of food are eggs, ſalt-fiſh, bacon, and muſhrooms; their favourite diſh is a kind of hodge podge, made of ſalt or ſometimes freſh meat, groats, rye-flour, highly ſeaſoned with onions and garlick, which latter ingredients are much uſed by the Ruſſians. Beſides, muſhrooms are ſo exceedingly common in theſe regions, as to form a very eſſential part of their proviſion. I ſeldom entered a cottage without ſeeing great abundance of them; and in paſſing through the markets, I was often aſtoniſhed at the prodigious quantity expoſed for ſale: their variety was no leſs remarkable than their number; they were of many colours, amongſt which I particularly noticed white, black, brown, yellow, green and pink. The common drink of the peaſants is quaſs, a fermented liquor, ſomewhat like ſweet wort, made by pouring warm water on rye or barley meal; and deemed an excellent antiſcorbutic. They are extremely fond of whiſky, a ſpirituous liquor diſtilled from malt, which the pooreſt can occaſionally command, and which their inclination often leads them to uſe to great exceſs."

Theſe people are extremely backward in the mechanic arts, though, where they have much intercourſe with other nations, this does not appear, and therefore does not proceed from natural inability; indeed we have already given an inſtance of one peaſant of Ruſſia, who ſeems to poſſeſs very ſuperior talents. See NEVA.

The dreſs of theſe people is well calculated for the climate in which they live: they are particularly careful of their extremities. On their legs they wear one or two pair of thick worſted ſtockings; and they envelope their legs with wrappers of coarſe flannel or cloth ſeveral feet in length, and over theſe they frequently draw a pair of boots, ſo large as to receive their bulky contents with eaſe. The lower ſort of people are groſsly ignorant; of which we ſhall give a very ſurpriſing inſtance in the words of Mr Coxe.—"In many families, the father marries his ſon while a boy of ſeven, eight, or nine years old, to a girl of a more advanced age, in order, as it is ſaid, to procure an able-bodied woman for the domeſtic ſervice: he cohabits with this perſon, now become his daughter-in-law, and frequently has ſeveral children by her. In my progreſs through Ruſſia, I obſerved in ſome cottages, as it were, two miſtreſſes of a family; one the peaſant's real wife, who was old enough to be his mother; and the other, who was nominally the ſon's wife, but in reality the father's concubine. Theſe inceſtuous marriages, ſanctified by inveterate cuſtom, and permitted by the pariſh-prieſts, were formerly more common than they are at preſent; but as the nation becomes more refined, and the prieſts ſomewhat more enlightened; and as they have lately been diſcountenanced by government, they are daily falling into diſuſe; and, it is to be hoped, will be no longer tolerated (A)."

(A) "The truth of this fact, which fell under my own obſervation, and which I authenticated by repeated inquiries from all ranks of people, is ſtill further confirmed by the following paſſage in the Antidote to the Journey into Siberia, although the author gives another reaſon for thoſe early marriages. 'The peaſants and common people not

Peaſant.

The peaſants of Ruſſia, like thoſe of Poland, are divided into thoſe of the crown and thoſe of individuals; the firſt of which are in the beſt condition; but all of them undergo great hardſhips, being ſubject to the deſpotic will of ſome cruel overſeer. They may get their freedom, 1. By manumiſſion on the death of their maſter, or otherwiſe: 2. By purchaſe; and, laſtly, By ſerving in the army or navy. The empreſs has redreſſed ſome of the grievances of this claſs of her ſubjects. The hardineſs of the peaſants ariſes in a great meaſure from their mode of education and way of life, and from the violent changes and great extremes of heat and cold to which they are expoſed.

" The peaſants of Finland differ widely from the Ruſſians in their look and dreſs: they had for the moſt part fair complexions, and many of them red hair: they ſhave their beards, wear their hair parted at the top, and hanging to a conſiderable length over their ſhoulders (B). We could not avoid remarking, that they were in general more civilized than the Ruſſians; and that even in the ſmalleſt villages we were able to procure much better accommodations than we uſually met with in the largeſt towns which we had hitherto viſited in that empire."

The peaſants of Sweden (Mr Coxe informs us) are more honeſt than thoſe in Ruſſia; in better condition, and poſſeſſing more of the conveniencies of life, both with reſpect to food and furniture. "They are well clad in ſtrong cloth of their own weaving. Their cottages, though built with wood, and only of one ſtory, are comfortable and commodious. The room in which the family ſleep is provided with ranges of beds in tiers (if I may ſo expreſs myſelf), one above the other: upon the wooden teſters of the beds in which the women lie, are placed others for the reception of the men, to which they aſcend by means of ladders. To a perſon who has juſt quitted Germany, and been accuſtomed to tolerable inns, the Swediſh cottages may perhaps appear miſerable hovels; to me, who had been long uſed to places of far inferior accommodation, they ſeemed almoſt palaces. The traveller is able to procure many conveniences, and particularly a ſeparate room from that inhabited by the family, which could ſeldom be obtained in the Poliſh and Ruſſian villages. During my courſe through thoſe two countries, a bed was a phenomenon which ſeldom occurred, excepting in the large towns, and even then not always completely equipped; but the pooreſt huts of Sweden were never deficient in this article of comfort: an evident proof that the Swediſh peaſants are more civilized than thoſe of Poland and Ruſſia.—After having witneſſed the ſlavery of the peaſants in thoſe two countries, it was a pleaſing ſatisfaction to find myſelf again among freemen, in a kingdom where there is a more equal diviſion of property; where there is no vaſſalage; where the loweſt order enjoy a ſecurity of their perſons and property; and where the advantages reſulting from this right are viſible to the commoneſt obſerver."

Peaſant, Peat.

The peaſants of Holland and Switzerland are all in a very tolerable condition; not ſubject to the undiſputed controul of a hireling maſter, they are freemen, and enjoy in their ſeveral ſtations the bleſſings of freedom. In Bohemia, Hungary, and a great part of Germany, they are legally ſlaves, and ſuffer all the miſeries attending ſuch a condition. In Spain, Savoy, and Italy, they are little better. In France, their ſituation was ſuch as to warrant the firſt Revolution; but by carrying matters too far, they are now infinitely worſe than they were at any former period.

PEAT, a well known inflammable ſubſtance, uſed in many parts of the world as fuel. There are two ſpecies:

1. A yellowiſh-brown or black peat, found in mooriſh grounds in Scotland, Holland, and Germany.—When freſh, it is of a viſcid conſiſtence, but hardens by expoſure to the air. It conſiſts, according to Kirwan, of clay mixed with calcareous earth and pyrites; ſometimes alſo it contains common ſalt. While ſoft, it is formed into oblong pieces for fuel, after the pyritaceous and ſtony matters are ſeparated. By diſtillation it yields water, acid, oil, and volatile alkali; the aſhes containing a ſmall proportion of fixed alkali; and being either white or red according to the proportion of pyrites contained in the ſubſtance.

The oil which is obtained from peat has a very pungent taſte; and an empyreumatic ſmell, leſs fetid than that of animal ſubſtances, more ſo than that of mineral bitumens: it congeals in the cold into a pitchy maſs, which liquefies in a ſmall heat: it readily catches fire from a candle, but burns leſs vehemently than other oils, and immediately goes out upon removing the external flame: it diſſolves almoſt totally in rectified ſpirit of wine into a dark browniſh red liquor.

2. The ſecond ſpecies is found near Newbury in Berkſhire. In the Philoſophical Tranſactions for the year 1757, we have an account of this ſpecies; the ſubſtance of which is as follows:

Peat is a compoſition of the branches, twigs, leaves, and roots of trees, with graſs, ſtraw, plants, and weeds, which having lain long in water, is formed into a maſs ſo ſoft as to be cut through with a ſharp ſpade. The colour is a blackiſh brown, and it is uſed in many places for firing. There is a ſtratum of this peat on each ſide the Kennet, near Newbury in Berks, which is from about a quarter to half a mile wide, and many miles long. The depth below the ſurface of the ground is from one foot to eight. Great numbers of entire trees are

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not only marry their ſons at 14 and 15 years of age, but even at eight or nine, and that for the ſake of having a workwoman the more in the perſon of the ſon's wife: By the ſame rule, they try to keep their daughters ſingle as long as poſſible, becauſe they don't chooſe to loſe a workwoman. Theſe premature marriages are of little uſe to the ſtate; for which reaſon, methods to get the better of this cuſtom have been ſought for, and, I hope will ſoon take place: the biſhops are attentive to prevent theſe marriages as much as poſſible, and have of late ſucceeded greatly in their endeavours. It is only the inhabitants of ſome of the provinces in Ruſſia that ſtill retain this bad cuſtom."

(B) The Ruſſians have generally dark complexions and hair: they alſo wear their beards, and cut their hair ſhort.

Peat ‖ Peck.

are found lying irregularly in the true peat. They are chiefly oaks, alders, willows, and firs, and appear to have been torn up by the roots: many horses heads, and bones of several kinds of deer, the horns of the antelope, the heads and tusks of boars, and the heads of beavers, are also found in it. Not many years ago an urn of a light brown colour, large enough to hold about a gallon, was found in the peat-pit in Speen moor, near Newbury, at about 10 feet from the river, and four feet below the level of the neighbouring ground. Juſt over the ſpot where the urn was found, an artificial hill was raiſed about eight feet high; and as this hill conſiſted both of peat and earth, it is evident that the peat was older than the urn. From the ſide of the river ſeveral ſemicircular ridges are drawn round the hill, with trenches between them. The urn was broken to ſhivers by the peat-diggers who found it, ſo that it could not be critically examined; nor can it be known whether any thing was contained in it.

For the mode of converting moſs or peat into a valuable manure, ſee AGRICULTURE *Index*.

PEAUCIER, in *Anatomy*, a name given by Winſlow, in his Treatiſe on the Head, and by ſome of the French writers, to the muſcle called by Albinus *latiſſimus colli*; and by others *detrahens quadratus*, and *quadratus genæ*. Santorini has called the part of this which ariſes from the cheek *musculus riſorius novus*; and ſome call the whole *platyſma myoides*.

PEBBLES, a trivial name frequently given to different varieties of the agate. See AGATE, MINERALOGY *Index*.

PECARY, in *Zoology*. See MAMMALIA *Index*.

PECCANT, in *Medicine*, an epithet given to the humours of the body, when they offend either in quantity or quality, i. e. when they are either morbid, or in too great abundance. Moſt diſeaſes ariſe from peccant humours, which are either to be corrected by alteratives and ſpecifics, or elſe to be evacuated.

PECHEM, in the *Materia Medica*, a name given by the modern Greek writers to the root called *behem* by Avicenna and Serapion. Many have been at a loſs to know what this root pechem was; but the virtues aſcribed to it are the ſame with thoſe of the behem of the Arabians; its deſcription is the ſame, and the diviſion of it into white and red is alſo the ſame as that of the behem. Nay, the word *pechem* is only formed of *behem* by changing the *b* into a *p*, which is very common, and the aſpirate into χ, or *ch*, which is as common. Myrepſus, who treats of this root, ſays the ſame thing that the Arabian Avicenna ſays of behem, namely, that it was the fragments of a woody root, much corrugated and wrinkled on the ſurface, which was owing to its being ſo moiſt whilſt freſh, that it always ſhrunk greatly in the drying.

PECHYAGRA, a name given by ſome authors to the gout affecting the elbow.

PECHYS, a name uſed by ſome anatomical writers for the elbow.

PECHYTYRBE, an epithet uſed by ſome medical writers for the ſcurvy.

PECK, a meaſure of capacity, four of which make a buſhel.

PECK, *Francis*, a learned antiquarian, was born at Stamford in Lincolnſhire, May 4. 1692, and educated at Cambridge, where he took the degree of B. and M. A. He was the author of many works, of which the firſt is a poem, entitled, "Sighs on the Death of Queen Anne;" printed probably about the time of her death in 1714. Two years afterwards he printed "ΤΟ ὝΨΟΣ ἍΓΙΟΝ; or an Exerciſe on the Creation, and an Hymn to the Creator of the World; written in the expreſs words of the ſacred Text, as an Attempt to ſhow the Beauty and Sublimity of the Holy Scriptures, 1716, 8vo." In 1721, being then curate of King's Clifton in Northamptonſhire, he iſſued propoſals for printing the Hiſtory and Antiquities of his native town, which was publiſhed in 1727, in folio, under the title of "*Academia tertia Anglicana;* or the Antiquarian Annals of Stamford in Lincoln, Rutland, and Northamptonſhires; containing the Hiſtory of the Univerſity, Monaſteries, Gilds, Churches, Chapels, Hoſpitals, and Schools there, &c." inſcribed to John duke of Rutland. This work was haſtened by "An Eſſay on the ancient and preſent State of Stamford, 1726, 4to," written by Francis Hargrave, who, in his preface, mentions the difference which had ariſen between him and Mr Peck, on account of the former's publication unfairly foreſtalling that intended by the latter. Mr Peck is alſo therein very roughly treated, on account of a ſmall work be had formerly printed, entitled, "The Hiſtory of the Stamford Bull-running." Mr Peck had before this time obtained the rectory of Godeby near Melton in Leiceſterſhire, the only preferment he ever enjoyed. In 1729, he printed on a ſingle ſheet, "Queries concerning the Natural Hiſtory and Antiquities of Leiceſterſhire and Rutland," which were afterwards reprinted in 1740; but although the progreſs he had made in the work was very conſiderable, yet it never made its appearance. In 1732 he publiſhed the firſt volume of "*Deſiderata Curioſa;* or, a Collection of divers ſcarce and curious Pieces relating chiefly to Matters of Engliſh Hiſtory; conſiſting of choice tracts, memoirs, letters, wills, epitaphs, &c. tranſcribed, many of them, from the originals themſelves, and the reſt from divers ancient MS. copies, or the MS. collations of ſundry famous antiquaries and other eminent perſons, both of the laſt and preſent age: the whole, as nearly as poſſible, digeſted into order of time, and illuſtrated with ample notes, contents, additional diſcourſes, and a complete index." This volume was dedicated to Lord William Manners, and was followed, in 1735, by a ſecond volume, dedicated to Dr Reynolds biſhop of Lincoln. In 1735 Mr Peck printed in a 4to pamphlet, "A complete catalogue of all the diſcourſes written both for and againſt popery in the time of King James II. containing in the whole an account of 457 books and pamphlets, a great number of them not mentioned in the three former catalogues; with references after each title, for the more ſpeedy finding a further account of the ſaid diſcourſes and their authors in ſundry writers, and an alphabetical liſt of the writers on each ſide." In 1739 he was the editor of "Nineteen Letters of the truly reverend and learned Henry Hammond, D. D. (author of the Annotations on the New Teſtament, &c.) written to Mr Peter Stainnough and Dr Nathaniel Angelo, many of them on curious ſubjects, &c." Theſe were printed from the originals, communicated by Mr Robert Marſden archdeacon of Nottingham, and Mr John Worthington. The next year, 1740, produced two volumes in 4to, one of them entitled, "Memoirs of the Life and Ac-

Peck.

tions of Oliver Cromwell, as delivered in three panegyrics of him written in Latin; the firſt, as ſaid, by Don Juan Roderiguez de Saa Meneſes, Conde de Penguiao, the Portugal ambaſſador; the ſecond, as affirmed by a certain Jeſuit, the lord ambaſſador's chaplain; yet both, it is thought, compoſed by Mr John Milton (Latin ſecretary to Cromwell), as was the third; with an Engliſh verſion of each. The whole illuſtrated with a large hiſtorical preface; many ſimilar paſſages from the Paradiſe Loſt, and other works of Mr John Milton, and notes from the beſt hiſtorians. To all which is added, a collection of divers curious hiſtorical pieces relating to Cromwell, and a great number of other remarkable perſons (after the manner of *Deſiderata Curioſa*, v. i. and ii.)" The other, "New Memoirs of the Life and poetical Works of Mr John Milton; with, firſt, an examination of Milton's ſtyle; and ſecondly, explanatory and critical notes on divers paſſages in Milton and Shakeſpeare, by the editor. Thirdly, Baptiſtes; a ſacred dramatic poem in defence of liberty, as written in Latin by Mr George Buchanan, tranſlated into Engliſh by Mr John Milton, and firſt publiſhed in 1641, by order of the houſe of commons. Fourthly, the Parallel, or Archbiſhop Laud and Cardinal Wolſey compared, a Viſion by Milton. Fifthly, the Legend of Sir Nicholas Throckmorton, knt. chief butler of England, who died of poiſon, *anno* 1570, an hiſtorical poem by his nephew Sir Thomas Throckmorton, knt. Sixth, Herod the Great, by the editor. Seventh, the Reſurrection, a poem in imitation of Milton, by a friend. And eighth, a Diſcourſe on the Harmony of the Spheres, by Milton; with prefaces and notes." Theſe were the laſt publications which he gave the world. When theſe appeared, he had in contemplation no leſs than nine different works; but whether he had not met with encouragement for thoſe which he had already produced, or whether he was rendered incapable of executing them by reaſon of his declining health, is uncertain; but none of them ever were made public. He concluded a laborious, and, it may be affirmed, an uſeful life, wholly devoted to antiquarian purſuits, Aug. 13. 1743, at the age of 61 years.

PECORA, in *Zoology*, the fifth order of the claſs mammalia, in the Linnean ſyſtem. See ZOOLOGY.

PECQUET, JOHN, was a phyſician in Dieppe, and died at Paris in 1674. He was phyſician in ordinary to the celebrated Fouquet, whom he entertained at his ſpare hours with ſome of the moſt amuſing experiments in natural philoſophy. He acquired immortal honour to himſelf by the diſcovery of a lacteal vein, which conveys the chyle to the heart; and which from his name is called *le Reſervoir de Pecquet*. This diſcovery was a freſh proof of the truth of the circulation of the blood: though it met with oppoſition from many of the learned, particularly from the famous Riolau, who wrote a treatiſe againſt the author of it, with this title: *Adverſus Pecquetum et Pecquetianos*. The only works which we have of Pecquet, are, 1. *Experimenta nova Anatomica*, publiſhed at Paris, 1654. 2. A Diſſertation, *De Thoracis Lacteis*, publiſhed at Amſterdam, 1661. He was a man of a lively and active genius; but his ſprightlineſs ſometimes led him to adopt dangerous opinions. He recommended, as a remedy for all diſeaſes, the uſe of brandy. This remedy, however, proved fatal to himſelf, and contributed to ſhorten his days, which he might have employed to the advantage of the public.

PECTEN, the SCALLOP; a ſpecies of ſhell-fiſh. See OSTREA, CONCHOLOGY *Index*.

PECTORAL, a ſacerdotal habit or veſtment, worn by the Jewiſh high-prieſt. The Jews called it *Hhoſchen*, the Greeks λογιον, the Latins *rationale* and *pectorale*, and in our verſion of the Bible it is called *breaſtplate*. It conſiſted of embroidered ſtuff, about a ſpan ſquare, and was worn upon the breaſt, ſet with twelve precious ſtones, ranged in four rows, and containing the names of the twelve tribes. It was faſtened to the ſhoulder by two chains and hooks of gold. God himſelf preſcribed the form of it. See BREASTPLATE.

PECTORAL, a breaſtplate of thin braſs, about 12 fingers ſquare, worn by the poorer ſoldiers in the Roman army, who were rated under 1000 drachmæ. See LORICA.

PECTORAL, an epithet for medicines good in diſeaſes of the breaſt and lungs.

PECTORALIS. See ANATOMY, *Table of the Muſcles*.

PECULATE, in *Civil Law*, the crime of embezzling the public money, by a perſon intruſted with the receipt, management, or cuſtody thereof. This term is alſo uſed by civilians for a theft, whether the thing be public, fiſcal, ſacred, or religious.

PECULIAR, in the *Canon Law*, ſignifies a particular pariſh or church that has juriſdiction within itſelf for granting probates of wills and adminiſtrations, exempt from the ordinary or biſhop's courts. The king's chapel is a royal peculiar, exempt from all ſpiritual juriſdiction, and reſerved to the viſitation and immediate government of the king himſelf. There is likewiſe the archbiſhop's peculiar; for it is an ancient privilege of the ſee of Canterbury, that wherever any manors or advowſons belong to it, they forthwith become exempt from the ordinary, and are reputed peculiars: there are 57 ſuch peculiars in the ſee of Canterbury.

Beſides theſe, there are ſome peculiars belonging to deans, chapters, and prebendaries, which are only exempted from the juriſdiction of the archdeacon: theſe are derived from the biſhop, who may viſit them, and to whom there lies an appeal.

Court of PECULIARS, is a branch of, and annexed to, the court of ARCHES. It has a juriſdiction over all thoſe pariſhes diſperſed through the province of Canterbury in the midſt of other dioceſes, which are exempt from the ordinary's juriſdiction, and ſubject to the metropolitan only. All eccleſiaſtical cauſes, ariſing within theſe peculiar or exempt juriſdictions, are originally cognizable by this court: from which an appeal lay formerly to the pope, but now by the ſtat. 25. Hen. VIII. c. 19. to the king in chancery.

PECULIUM, the ſtock or eſtate which a perſon, in the power of another, whether male or female, either as his or her ſlave, may acquire by his induſtry. Roman ſlaves frequently amaſſed conſiderable ſums in his way. The word properly ſignifies the advanced price which a ſlave could get for his maſter's cattle, &c. above the price fixed upon them by his maſter, which was the ſlave's own property.

In the Romiſh church, peculium denotes the goods which each religious reſerves and poſſeſſes to himſelf.

PEDALS, the largeſt pipes of an organ, ſo called becauſe played and ſtopped with the foot. The pedals are made ſquare, and of wood; they are uſually 13 in number. They are of modern invention, and ſerve to carry the ſounds of an octave deeper than the reſt. See Organ.

PEDAGOGUE, or Pædagogue, a tutor or maſter, to whom is committed the diſcipline and direction of a ſcholar, to be inſtructed in grammar and other arts. The word is formed from the Greek παιδων αγωγος, *puerorum ductor*, "leader of boys."

M. Fleury obſerves, that the Greeks gave the name *pædagogus* to ſlaves appointed to attend their children, lead them, and teach them to walk, &c. The Romans gave the ſame denomination to the ſlaves who were intruſted with the care and inſtruction of their children.

PEDANT, a ſchoolmaſter or pedagogue, who profeſſes to inſtruct and govern youth, teach them the humanities, and the arts. See Pedagogue.

Pedant is alſo uſed for a rough, unpoliſhed man of letters, who makes an impertinent uſe of the ſciences, and abounds in unſeaſonable criticiſms and obſervations.

Dacier defines a pedant, a perſon who has more reading than good ſenſe. See Pedantry.

Pedants are people ever armed with quibbles and ſyllogiſms, breathe nothing but diſputation and chicanery, and purſue a propoſition to the laſt limits of logic.

Malebranche deſcribes a pedant as a man full of falſe erudition, who makes a parade of his knowledge, and is ever quoting ſome Greek or Latin author, or hunting back to a remote etymology.

St Evremont ſays, that to paint the folly of a pedant, we muſt repreſent him as turning all converſation to ſome one ſcience or ſubject he is beſt acquainted withal.

There are pedants of all conditions, and all robes, Wicquefort ſays, an ambaſſador, always attentive to formalities and decorums, is nothing elſe but a political pedant.

PEDANTRY, or Pedantism, the quality or manner of a pedant. See Pedant.

To ſwell up little and low things, to make a vain ſhow of ſcience, to heap up Greek and Latin, without judgement, to tear thoſe to pieces who differ from us about a paſſage in Suetonius or other ancient authors, or in the etymology of a word, to ſtir up all the world againſt a man for not admiring Cicero enough, to be intereſted for the reputation of an ancient as if he were our next of kin, is what we properly call *pedantry*.

PEDARIAN, in Roman antiquity, thoſe ſenators who ſignified their votes by their feet, not with their tongues; that is, ſuch as walked over to the ſide of thoſe whoſe opinion they approved of, in diviſions of the ſenate.

Dr Middleton thus accounts for the origin of the word. He ſays, that though the magiſtrates of Rome had a right to a place and vote in the ſenate both during their office and after it, and before they were put upon the roll by the cenſors, yet they had not probably a right to ſpeak or debate there on any queſtion, at leaſt in the earlier ages of the republic. For this ſeems to have been the original diſtinction between them and the ancient ſenators, as it is plainly intimated in the formule of the conſular edict, ſent abroad to ſummon the ſenate, which was addreſſed to all ſenators, and to all thoſe who had a right to vote in the ſenate. From this diſtinction, thoſe who had only a right to vote were called in ridicule *pedarian*; becauſe they ſignified their votes by their feet, not their tongues, and upon every diviſion of the ſenate went over to the ſide of thoſe whoſe opinion they approved. It was in alluſion to this old cuſtom, which ſeems to have been wholly dropt in the latter ages of the republic, that the mute part of the ſenate continued ſtill to be called by the name of *pedarians*, as Cicero informs us, who in giving an account to Atticus of a certain debate and decree of the ſenate upon it, ſays that it was made with the eager and general concurrence of the pedarians, though againſt the authority of all the conſulars.

PEDATURA, a term uſed, in Roman antiquity, for a ſpace or proportion of a certain number of feet ſet out. This word often occurs in writers on military affairs: as in Hyginus de Caſtrametatione we meet with *meminerimus itaque ad computationem cohortis equitatæ milliariæ pedaturam ad mille trecentos ſexaginta dari debere*; which is thus explained: The pedatura, or ſpace allowed for a *cohors equitata* or provincial cohort, conſiſting of both horſe and foot, could not be the ſame as the pedatura of an uniform body of infantry, of the ſame number, but muſt exceed it by 360 feet; for the proportion of the room of one horſeman to one foot ſoldier he aſſigns as two and a half to one.

PEDERASTS, the ſame with Sodomites.

PEDESTAL, in *Architecture*, the loweſt part of an order of columns, being that part which ſuſtains the column, and ſerves it as a foot to ſtand. See Column.

PEDIÆAN, in Grecian antiquity. The city of Athens was anciently divided into three different parts; one on the deſcent of a hill; another on the ſea-ſhore; and a third in a plain between the other two. The inhabitants of the middle region were called Πεδιαιοι, *Pediæans*, formed from πεδιον, "plain," or "flat;" or as Ariſtotle will have it, *Pediaci*: thoſe of the hill, Diacrians; and thoſe of the ſhore, Paralians.

Theſe quarters uſually compoſed ſo many different factions. Piſiſtratus made uſe of the Pediæans againſt the Diacrians. In the time of Solon, when a form of government was to be choſen, the Diacrians choſe it democratic; the Pediæans demanded an ariſtocracy; and the Paralians a mixed government.

PEDICLE, among botaniſts, that part of a ſtalk which immediately ſuſtains the leaf of a flower or a fruit, and is commonly called a *footſtalk*.

PEDICULUS, the Louse, a genus of inſects belonging to the order of aptera. See Entomology *Index*.

PEDILUVIUM, or *Bathing of the Feet*. The uſes of warm bathing in general, and of the pediluvium in particular, are ſo little underſtood, that they are often prepoſterouſly uſed, and ſometimes as injudiciouſly abſtained from.

In the Edinburgh Medical Eſſays, we find an ingenious author's opinion of the warm pediluvium, notwithſtanding that of Borelli, Boerhaave, and Hoffman, to the contrary, to be, That the legs becoming warmer than before, the blood in them is warmed: this blood rarifying, diſtends the veſſels; and in circulating imparts a great degree of warmth to the reſt of the maſs; and as there is a portion of it conſtantly paſſing through the legs, and acquiring new heat there, which heat is in the courſe of circulation communicated to the reſt of the blood, the whole maſs rarifying, occupies a larger ſpace, and of conſequence circulates with greater force. The volume of the blood being thus increaſed, every veſſel is diſtended, and every part of the body feels the effects of it; the diſtant parts a little later than thoſe firſt heated. The benefit obtained by a warm pediluvium is generally attributed to its making a derivation into the parts immerſed, and a revulſion from thoſe affected, becauſe they are relieved; but the cure is performed by the direct contrary method of operating, viz. by a greater force of circulation through the parts affected, removing what was ſtagnant or moving too ſluggiſhly there. Warm bathing is of no ſervice where there is an irreſoluble obſtruction, though, by its taking off from a ſpaſm in general, it may ſeem to give a moment's eaſe; nor does it draw from the diſtant parts, but often hurts by puſhing againſt matter that will not yield with a ſtronger impetus of circulation than the ſtretched and diſeaſed veſſels can bear: ſo that where there is any ſuſpicion of ſcirrhus, warm bathing of any ſort ſhould never be uſed. On the other hand, where obſtructions are not of long ſtanding, and the impacted matter is not obſtinate, warm baths may be of great uſe to reſolve them quickly. In recent colds, with ſlight humoral peripneumonies, they are frequently an immediate cure. This they effect by increaſing the force of the circulation opening the veſſels, and driving freely through the lungs that lentor which ſtagnated or moved ſlowly in them. As thus conducing to the reſolution of obſtructions, they may be conſidered as ſhort and ſafe fevers; and in uſing them we imitate nature, which by a fever often carries off an obſtructing cauſe of a chronical aliment. Borelli, Boerhaave, and Hoffman, are all of opinion, that the warm pediluvium acts by driving a larger quantity of blood into the parts immerſed. But arguments muſt give way to facts: the experiments related in the Medical Eſſays ſeem to prove to a demonſtration, that the warm pediluvium acts by rarifying the blood.

A warm pediluvium, when rightly tempered, may be uſed as a ſafe cordial, by which circulation can be rouſed, or a gentle fever raiſed; with this advantage over the cordials and ſudorifics, that the effect of them may be taken off at pleaſure.

Pediluvia are ſometimes uſed in the ſmallpox; but Dr Stevenſon thinks their frequent tumultuous operations render that ſuſpected, and at beſt of very doubtful effect; and he therefore prefers Monſ. Martin of Lauſanne's method of bathing the ſkin, not only of the legs, but of the whole body, with a ſoft cloth dipped in warm water, every four hours, till the eruption; by which means the puſtules may become univerſally higher, and conſequently more ſafe.

PEDIMENT. See ARCHITECTURE.

PEDLAR, a travelling foot-trader. See HAWKERS.

In Britain (and formerly in France) the pedlars are deſpiſed; but it is otherwiſe in certain countries. In Spaniſh America, the buſineſs is ſo profitable, that it is thought by no means diſhonourable: and there are many gentlemen in Old Spain, who, when their circumſtances are declining, ſend their ſons to the Indies to retrieve their fortunes in this way. Almoſt all the commodities of Europe are diſtributed through the ſouthern continent of America by means of theſe pedlars. They come from Panama to Paita by ſea; and in the road from the port laſt mentioned, they make Piura their firſt voyage to Lima. Some take the road through Caxamalia: others through Truxillo, along ſhore from Lima. They take their paſſage back to Panama by ſea, and perhaps take with them a little cargo of brandy. At Panama they again ſtock themſelves with European goods, returning by ſea to Paita, where they are put on ſhore; there they hire mules and load them, the Indians going with them in order to lead them back. Their travelling expences are next to nothing; for the Indians are brought under ſuch ſubjection, that they find lodging for them, and provender for their mules, frequently thinking it an honour done them for their gueſts to accept of this for nothing, unleſs the ſtranger now and then, out of generoſity or compaſſion, makes a ſmall recompence.

In Poland, where there are few or no manufactures, almoſt all the merchandiſe is carried on by pedlars, who are ſaid to be generally Scotſmen, and who, in the reign of King Charles II. are ſaid to have amounted to no fewer than 53,000.

PEDOMETER, or PODOMETER, formed from πȣς, *pes*, "foot," and μετρον, "meaſure," way-wiſer; a mechanical inſtrument, in form of a watch, conſiſting of various wheels with teeth, catching in one another, all diſpoſed in the ſame plane; which, by means of a chain or ſtring faſtened to a man's foot, or to the wheel of a chariot, advance a notch each ſtep, or each revolution of the wheel; ſo that the number being marked on the edge of each wheel, one may number the paces, or meaſure exactly the diſtance from one place to another. There are ſome of them which mark the time on a dial-plate, and are in every reſpect much like a watch, and are accordingly worn in the pocket like a watch. See PERAMBULATOR.

PEDRO, DON, of Portugal, duke of Coimbra, was the fourth child and ſecond ſurviving ſon of King John of Portugal, and was born March the 4th 1394. His father gave him an excellent education, which, joined to ſtrong natural abilities and much application, rendered him one of the moſt accompliſhed princes of his time. He was not only very learned himſelf, but a great lover of learning, and a great patron of learned men. It was chiefly with a view to improve his knowledge that he ſpent four years in travelling through different countries in Europe, Aſia, and Africa, with a train ſuitable to his quality; of which travels there is a relation ſtill extant, but ſo loaded with fabulous circumſtances, that it wounds the reputation it was deſigned to raiſe. At his return he eſpouſed Iſabella, daughter to the count of Urgel, and grand-daughter to Don Pedro, the fourth king of Portugal, which was eſteemed a very great advancement of his fortune. He was elected into the moſt noble order of the Garter, April 22. 1417, in the fifth year of the reign of his couſin Henry V. grandſon of John of Gaunt, by the father's ſide, as our duke of Coimbra was by the mother. In 1440 he was declared regent during the minority of his couſin Don Alonſo V. ſon of King Edward, who died by the plague. He found ſome difficulty at firſt in the diſcharge of his office, both from the queen-mother and others. But, upon the whole, his adminiſtration was ſo mild and ſo juſt, that the magiſtrates and people of Liſbon concurred in demanding his leave to erect a ſtatue to him. The regent thanked them, ſaid he ſhould be unwilling to ſee a work of theirs demoliſhed; and that he was ſufficiently rewarded by this public teſtimony of their affections. The queen dowager wiſhed to raiſe diſturbances in Portugal by aiming to recover the regency to herſelf; but the mildneſs of the regent's adminiſtration, the attachment of the beſt part of the nobility to him, and his enjoying, in ſo abſolute a degree, the confidence of the people, not only ſecured the interior tranquillity of the ſtate, but raiſed the credit likewiſe of the crown of Portugal to a very great height in the ſentiments of its neighbours: for in the courſe of his regency he had made it his continual ſtudy to purſue the public good; to eaſe the people in general, and the inhabitants of Liſbon in particular, of ſeveral impoſitions; to maintain the laws in their full vigour; to give the king an excellent education; and if that had been at all practicable, to diffuſe a perfect unanimity through the court, by aſſuaging the malice and envy of his enemies. The king when he came of age, and the *cortes* or parliament, expreſſed their entire ſatisfaction with the regent's adminiſtration; and all parties entirely approved of the king's marriage with Donna Iſabella, the regent's daughter, which was celebrated in 1446. The enmity of his enemies, however, was not in the leaſt abated by the regent's being out of office. They ſtill perſecuted him with their unjuſt calumnies, and unfortunately made the king hearken to their falſehoods. The unfortunate duke, when ordered to appear before the king, was adviſed to take with him an eſcort of horſe and foot. In his paſſage he was proclaimed a rebel, and quickly after he was ſurrounded by the king's troops. Soon after he was attacked, and in the heat of action he was killed: nor was the envy of his enemies even then ſatiated; his body was forbid burial; and was at length taken away privately by the peaſants. His virtue, however hated in courts, was adored by the uncorrupt part of his countrymen. At length, though, by an inſpection of his papers, the king ſaw, when it was too late, the injuſtice that had been done the man who had behaved ſo well in ſo high and difficult an office; and whoſe papers only diſcovered ſigns of further benefit to the king and his dominions. In conſequence of theſe diſcoveries, the duke's adherents were declared loyal ſubjects, all proſecutions were ordered to ceaſe, and the king deſired the body of Coimbra to be tranſported with great pomp from the caſtle of Abrantes to the monaſtery of Batalha; where it was interred in the tomb which he had cauſed to be erected for himſelf. The royal name of Don Pedro occurs often in the hiſtory of Portugal, and many who bore the name were ſingularly diſtinguiſhed either for great abilities, or external ſplendor. See PORTUGAL.

PEDUNCLE, in *Botany*. See PEDICLE.

PEEBLES, a royal borough and county town of Peebles-ſhire or Tweedale, is ſituated on the banks of the Tweed, 22 miles ſouth from Edinburgh. Peebles was a royal reſidence in the time of James I. of Scotland; and here it is ſuppoſed, he compoſed the poem of "Peebles at the Play." Peebles has conſiderable woollen manufactures, and is noted for excellent beer. Population in 1793 amounted to 1480 inhabitants.

PEEBLES-SHIRE, or TWEEDALE, a county of Scotland, extending 36 miles in length and about 10 in breadth. It is bounded on the eaſt by Ettrick Foreſt, on the ſouth by Annandale, on the weſt by Clydeſdale, and on the north by Mid-Lothian. Tweedale is a hilly country, well watered with the Tweed, the Yarrow, and a great number of ſmaller ſtreams that fertilize the valleys, which produce good harveſts of oats and barley, with ſome proportion of wheat. All the rivers of any conſequence abound with trout and ſalmon. The lake called *[illegible]-Water Loch* ſwarms with a prodigious number of eels. In the month of Auguſt, when the weſt wind blows, they tumble into the river Yarrow in ſuch ſhoals, that the people who wade in to catch them run the riſk of being overturned. About the middle of this county is the hill or mountain of Braidalb, from the top of which the ſea may be ſeen on each ſide of the iſland. Tweedale abounds with limeſtone and freeſtone. The hills are generally as green as the downs in Suſſex, and feed innumerable flocks of ſheep, that yield great quantities of excellent wool. The country is well ſhaded with woods and plantations, abounds with all the neceſſaries of life, and is adorned with many fine ſeats and ſeveral populous villages. The earls of March were hereditary ſheriffs of Tweedale, which beſtows the title of *marquis* on a branch of the ancient houſe of Hay, earls of Errol, and hereditary high conſtables of Scotland. The family of Tweedale is, by the female ſide, deſcended from the famous Simon de Fraſer, proprietor of great part of this county, who had a great ſhare in obtaining the triple victory at Roſlin. The chief town in Tweedale, is PEEBLES, a royal borough, and ſeat of a preſbytery, pleaſantly ſituated on the banks of the Tweed, over which there is at this place a ſtately ſtone bridge of five arches. In the neighbourhood of Peebles, near the village of Romana, on the river Lene, we ſee the veſtiges of two Roman caſtella, or ſtationary forts; and a great many terraces on the neighbouring hills, which perhaps have ſerved as itinerary encampments. In the ſhire of Tweedale there are many ancient and honourable families of the gentry. Among theſe, Douglas of Cavers, who was hereditary ſheriff of the county, ſtill preſerves the ſtandard and the iron mace of the gallant Lord Douglas, who fell in the battle of Otterburn, juſt as his troops had defeated and taken Henry Percy, ſurnamed *Hotſpur*. In the church-yard of Drumelzier, belonging to an ancient branch of the Hay family, the famous Merlin is ſuppoſed to lie buried. There was an old traditional prophecy, that the two kingdoms ſhould be united when the waters of the Tweed and the Panſel ſhould meet at his grave. Accordingly, the country people obſerve that this meeting happened in conſequence of an inundation at the acceſſion of James VI. to the crown of England.

The population of this county, in 1801, amounted to 8717. But the following is the population at two different periods, according to its pariſhes.

	Pariſhes.	Population in 1755.	Population in 1790—1798.
1	Broughton	367	264
	Drumelzier	325	270
	Eddleſtown	679	710
	Glenholm	392	300
5	Inverleithen	559	560
	Kilbucho	279	362
	Kirkurd	310	288
	Linton	831	928

Lyne

	Pariſhes.	Population in 1755.	Population in 1790—1798.
	Lyne	265	160
10	Mannor	320	229
	Newlands	1009	891
	Peebles	1896	1920
	Skirling	335	234
	Stobo	313	318
15	Traquair	651	446
16	Tweedſmuir	397	227
		8908	8107
		8107	
	Decreaſe,	801 *	

PEEK, in the ſea-language, is a word uſed in various ſenſes. Thus the anchor is ſaid to be a-peek, when the ſhip being about to weigh comes over her anchor in ſuch a manner that the cable hangs perpendicularly between the hauſe and the anchor.

To heave a-peek, is to bring the peek ſo as that the anchor may hang a-peek. A ſhip is ſaid to ride a-peek, when lying with her main and foreyards hoiſted up, one end of her yards is brought down to the ſhrouds, and the other raiſed up on end; which is chiefly done when ſhe lies in rivers, leſt other ſhips falling foul of the yards ſhould break them. Riding a-broad peek, denotes much the ſame, excepting that the yards are only raiſed to half the height.

Peek is alſo uſed for a room in the hold, extending from the bitts forward to the ſtern: in this room men of war keep their powder, and merchantmen their victuals.

PEEL, a town in the iſle of Man, formerly called Holm-town, has a fort in a ſmall iſland, and a garriſon well ſupplied with cannon. In it are the ancient cathedral, the lord's houſe, with ſome lodgings of the biſhops, and other remains of antiquity.

PEER, in general, ſignifies an equal, or one of the ſame rank and ſtation: hence in the acts of ſome councils, we find theſe words, *with the conſent of our peers, biſhops, abbots*, &c. Afterwards the ſame term was applied to the vaſſals or tenants of the ſame lord, who were called *peers*, becauſe they were all equal in condition, and obliged to ſerve and attend him in his courts; and peers *in fiefs*, becauſe they all held fiefs of the ſame lord.

The term *peers* is now applied to thoſe who are impannelled in an inqueſt upon a perſon for convicting or acquitting him of any offence laid to his charge: and the reaſon why the jury is ſo called, is becauſe, by the common law and the cuſtom of this kingdom, every perſon is to be tried by his peers or equals; a lord by the lords, and a commoner by commoners. See the article JURY.

PEER of the Realm, a noble lord who has a ſeat and vote in the houſe of lords, which is alſo called the *Houſe of Peers.*

Theſe lords are called *peers*, becauſe though there is a diſtinction of degrees in our nobility, yet in public actions they are equal, as in their votes in parliament, and in trying any nobleman or other perſon impeached by the commons, &c. See PARLIAMENT.

Houſe of PEERS, or *Houſe of Lords*, forms one of the three eſtates of parliament. See LORDS and PARLIAMENT.

In a judicative capacity, the houſe of peers is the ſupreme court of the kingdom, having at preſent no original juriſdiction over cauſes, but only upon appeals and writs of error; to rectify any injuſtice or miſtake of the law committed by the courts below. To this authority they ſucceeded of courſe upon the diſſolution of the *Aula Regia*. For as the barons of parliament were conſtituent members of that court, and the reſt of its juriſdiction was dealt out to other tribunals, over which the great officers who accompanied thoſe barons were reſpectively delegated to preſide, it followed, that the right of receiving appeals, and ſuperintending all other juriſdictions, ſtill remained in that noble aſſembly, from which every other great court was derived. They are therefore in all caſes the laſt reſort, from whoſe judgement no farther appeal is permitted; but every ſubordinate tribunal muſt conform to their determinations: The law repoſing an entire confidence in the honour and conſcience of the noble perſons who compoſe this important aſſembly, that they will make themſelves maſters of thoſe queſtions upon which they undertake to decide; ſince upon their deciſion all property muſt finally depend. See LORDS, NOBILITY, &c.

PEERS, in the former government of France, were twelve great lords of that kingdom; of which ſix were dukes and ſix counts; and of theſe, ſix were eccleſiaſtics and ſix laymen: thus the archbiſhop of Rheims, and the biſhop of Laon and Langres, were dukes and peers; and the biſhops of Chalons on the Marn, Noyons, and Beauvais, were counts and peers. The dukes of Burgundy, Normandy, and Aquitain, were lay peers and dukes; and the counts of Flanders, Champagne, and Toulouſe, lay peers and counts. Theſe peers aſſiſted at the coronation of kings, either in perſon or by their repreſentatives, where each performed the functions attached to his reſpective dignity: but as the ſix lay peerages were all united to the crown, except that of the count of Flanders, ſix lords of the firſt quality were choſen to repreſent them: but the eccleſiaſtical peers generally aſſiſted in perſon. The title of peer was lately beſtowed on every lord whoſe eſtate was erected into a peerage; the number of which, as it depended entirely on the king, was uncertain.

PEERESS, a woman who is noble by deſcent, creation, or marriage. For, as we have noblemen of ſeveral ranks, ſo we may have noblewomen; thus King Henry VIII. made Anne Bullen marchioneſs of Pembroke; King James I. created the lady Compton, wife to Sir Thomas Compton, counteſs of Buckingham, in the lifetime of her huſband, without any addition of honour to him; and alſo the ſame king made the lady Finch, viſcounteſs of Maidſtone, and afterwards counteſs of Winchelſea, to her and the heirs of her body; and King George I. made the lady Schulenberg, ducheſs of Kendal.

If a peereſs, by deſcent or creation, marry a perſon under the degree of nobility, ſhe ſtill continues noble: but if ſhe obtain that dignity only by marriage, ſhe loſes it, on her afterwards marrying a commoner; yet by the courteſy of England, ſhe generally retains the title of her nobility.

* Statiſt. Hiſt. vol. xx.

A countess or baroness may not be arrested for debt or treſpaſs; for though in reſpect of their ſex, they cannot ſit in parliament, they are nevertheleſs peers of the realm, and ſhall be tried by their peers, &c.

PEWIT, a ſpecies of gull. See LARUS, ORNITHOLOGY *Index*.

PEGASUS, among the poets, a horſe imagined to have wings, being that on which Bellerophon was fabled to be mounted when he engaged the Chimera. See CHIMÆRA.

The opening of the fountain Hippocrene on Mount Helicon is aſcribed to a blow of Pegaſus's hoof. It was feigned to have flown away to heaven, where it became a conſtellation. Hence

PEGASUS, in *Aſtronomy*, the name of a conſtellation of the northern hemiſphere, in form of a flying horſe. See ASTRONOMY.

PEGMARES, a name by which certain gladiators were diſtinguiſhed, who fought upon moveable ſcaffolds called *pegmata*, which were ſometimes unexpectedly raiſed, and by this means ſurpriſed the people with gladiators in hot contention. They were ſometimes ſo ſuddenly lifted up as to throw the combatants into the air; and ſometimes they were let down into dark and deep holes, and then ſet on fire, thus becoming the funeral-piles of theſe miſerable wretches; and roaſting them alive to divert the populace.

PEGU, a very conſiderable kingdom of Aſia, beyond the Ganges. The country properly ſo called is but about 350 miles in length from north to ſouth, and as much in breadth from eaſt to weſt. It is ſituated on the eaſtern ſide of the bay of Bengal, nearly oppoſite to Arixa, and to the north-eaſt of the coaſt of Coromandel. It is bounded on the north by the kingdoms of Arrakan and Ava; on the eaſt by the Upper and Lower Siam; on the ſouth by part of Siam and the ſea; and on the weſt by the ſea and part of Arrakan.

The kingdom of Pegu is ſaid to have been founded about 1100 years ago. Its firſt king was a ſeaman; concerning whom and his ſucceſſors we know nothing till the diſcovery of the Eaſt Indies by the Portugueſe in the beginning of the 16th century. In 1518 the throne of Pegu was poſſeſſed by one Breſſagukan, with whom Antony Correa the Portugueſe ambaſſador ſolemnly concluded a peace in 1519. This monarch was poſſeſſed of a very large and rich empire, nine kingdoms being in ſubjection to him, whoſe revenues amounted to three millions of gold. We hear no farther account of his tranſactions after the concluſion of the treaty with the Portugueſe. In 1539 he was murdered on the following occaſion: Among other princes who were his tributaries was Para Mandera, king of the Birmans or Barmans. Theſe people inhabited the high lands called *Pan aviran*, to the northward of the kingdom of Pegu. Their prince, by one of the terms of his vaſſalage, was obliged to furniſh the king of Pegu with 30,000 Birmans to labour in his mines and other public works. As the king uſed frequently to go and ſee how his works went forward, and in theſe journeys took along with him none but his women, the Birmans obſerving theſe viſits frequently repeated, formed a deſign of robbing the queen and all the concubines of their jewels; and purſuant to this deſign, the next time the king viſited the works, they murdered him, and having ſtripped the ladies, fled to their own country.

By this calamity all Pegu was thrown into confuſion: but, inſtead of revenging the death of their king, the people divided everywhere into factions; ſo that Dacha Rupi, the lawful heir to the crown, found himſelf unable to maintain his authority. Of theſe commotions, the king of the Birmans taking the advantage, not only ſhook off the yoke, but formed a deſign of conquering the kingdom of Pegu itſelf.—With this view he invaded the country with an army of more than a million of foot, and 5000 elephants; beſides a great fleet which he ſent down the river Ava towards Bagou or Pegu, the capital of the empire; while he himſelf marched thither by land. Juſt at this time Ferdinand de Mirales arrived at Pegu from Goa with a large galleon richly laden on account of the king of Portugal. As ſoon as Dacha Rupi heard of his coming, he ſent to deſire his aſſiſtance againſt the enemy. This he obtained by great preſents and promiſes: and Mirales, ſetting out in a galliot, joined the king's ſhips. Had the numbers been any thing near an equality, the ſuperior ſkill of Mirales would undoubtedly have gained the victory: But the fleet of the Birmans covered the whole river, though as large as the Ganges, while that of Dacha Rupi could ſcarcely be obſerved in compariſon with them. Mirales did every thing that man could do, and even held out alone after the natives had deſerted him; but at laſt, oppreſſed and overwhelmed with numbers, he was killed, with all his men.

Thus Para Mandara became maſter of all Pegu; after which he attacked the tributary kingdoms. In 1544 he beſieged Martavan, the capital of a kingdom of the ſame name, then very great and flouriſhing. The land forces which he brought againſt it conſiſted of 700,000 men, while by ſea he attacked it with a fleet of 1700 ſail; 100 of which were large galleys, and in them 700 Portugueſe commanded by John Cayero, who had the reputation of being a valiant and experienced officer. The ſiege, however, continued ſeven months, during which time the Birmans loſt 120,000 men; but at laſt the beſieged king, finding himſelf ſtraitened for want of proviſions, and unable to withſtand ſo great a power, offered terms of capitulation. The beſiegers would admit of no terms, upon which the diſtreſſed king applied to the Portugueſe in the ſervice of his enemy; for by their aſſiſtance he doubted not to be able to drive away the Birmans. Accordingly, he ſent one Seixas to Cayero, intreating him to receive himſelf, his family, and treaſure, on board the four ſhips he had under his command; offering, on that condition, to give half his riches to the king of Portugal, to become his vaſſal, and pay ſuch tribute as ſhould be agreed upon. Cayero conſulted the principal officers, and in their preſence aſked Seixas what he thought the treaſure might amount to. Seixas anſwered, that out of what he had ſeen, for he had not ſeen all, two ſhips might be loaded with gold, and four or five with ſilver. This propoſal was too advantageous to be ſlighted; but the reſt of the officers envying the great fortune which Cayero would make, threatened to diſcover the whole to the king of Barma or Birma if he did not reject it. The unhappy king of Martavan had now no other reſource but to ſet fire to the city, make a ſally, and die honourably with the few men he had with him: but even here he was diſappointed; for by the deſertion of 4000 of his troops the enemy were apprized of his deſign, and prevented it. Thus

Pegu. betrayed, he capitulated with the Barma king for his own life and the lives of his wife and children, with leave to end his days in retirement. All this was readily granted, but the conqueror intended to perform no part of his promiſe. The city was plundered and burnt, by which above 60,000 perſons periſhed, while at leaſt an equal number were carried into ſlavery. Six thouſand cannon were found in the place; 100,000 quintals of pepper, and an equal quantity of other ſpices. The day after this deſtruction, 21 gibbets were erected on a hill adjoining to the city; on which the queen, her children, and ladies, were executed, by hanging them up alive by the feet: however, the queen expired with anguiſh before ſhe ſuffered ſuch a cruel indignity. The king, with 50 of his chief lords, was caſt into the ſea, with ſtones about their necks. This monſtrous cruelty ſo provoked the tyrant's ſoldiers, that they mutinied, and he was in no ſmall danger of ſuffering for it: however, he found means to pacify them; after which he proceeded to beſiege Prom, the capital of another kingdom. Here he increaſed his army to 900,000 men. The queen by whom it was governed offered to ſubmit to be his vaſſal; but nothing would ſatisfy the Barma monarch leſs than her ſurrender at diſcretion, and putting all her treaſure into his hands. This ſhe, who knew his perfidy, refuſed to do: on which the city was fiercely aſſaulted, but greatly to the diſadvantage of the Barmas, who loſt near 100,000 men. However, the city was at laſt betrayed to him, when Mandara behaved with his uſual cruelty. Two thouſand children were ſlain, and their bodies cut in pieces and thrown to the elephants; the queen was ſtripped naked, publicly whipped, and then tortured, till ſhe died; the young king was tied to her dead body, and both together caſt into a river, as were alſo 300 other people of quality.

While the tyrant was employed in fortifying the city, he was informed, that the prince of Ava had ſailed down the river Queytor with 400 rowing veſſels having 30,000 ſoldiers on board; but that, hearing of the queen's diſaſter, he ſtopped at Meletay, a ſtrong fortreſs about 12 leagues north of Prom, where he waited to be joined by his father the king of Ava with 80,000 men. On this news the Barma king ſent his foſter-brother Chaumigrem along the river ſide with 200,000 men, while he himſelf followed with 100,000 more. The prince, in this emergency, burnt his barks, forming a vanguard of the mariners, and, putting his ſmall army in the beſt poſition he could, expected the enemy. A moſt deſperate engagement enſued, in which 800 only of the prince's army were left, and 115,000 out of 200,000 Barmas who oppoſed him were killed. The 800 Avans retired into the fort: but Mandara coming up ſoon after, and being enraged at the terrible havock made in his army, attacked the fortreſs moſt violently for ſeven days; at the end of which time, the 800, finding themſelves unable to hold out any longer, ruſhed out in a dark and rainy night, in order to ſell their lives at as dear a rate as poſſible. This laſt effort was ſo extremely violent, that they broke through the enemy's troops in ſeveral places, and even preſſed ſo hard on the king himſelf that he was forced to jump into the river. However, they were at laſt all cut off, but not before they had deſtroyed 12,000 of their enemies.

Mandara having thus become maſter of the fort, commanded it to be immediately repaired; and ſailed up the river to the port of Ava, about a league from the capital, where he burnt between 2000 and 3000 veſſels, and loſt in the enterpriſe about 8000 men. The city itſelf he did not think proper to inveſt, as it had been newly fortified, was defended by a numerous garriſon, and an army of 80,000 men was advancing to its relief. The king alſo, apprehenſive of Mandara's power, had implored the protection of the emperor of Siam; offering to become his tributary on condition that he would aſſiſt him with his forces in recovering the city of Prom. To this the emperor readily aſſented; which news greatly alarmed the Barma monarch, ſo that he diſpatched ambaſſadors to the Kalaminham or ſovereign of a large territory adjacent, requeſting him to divert the emperor from his purpoſe. On the ambaſſadors return from this court, it appeared that the treaty had already taken effect; but as the ſeaſon was not yet arrived for invading Ava, Chaumigrem, the king's foſter-brother, was ſent with 150,000 men to reduce Sebadi or Savadi the capital of a ſmall kingdom about 130 leagues north-eaſt from Pegu. The general, however, failed in his attempt; and afterwards endeavouring to revenge himſelf on a town in the neighbourhood, he was ſurpriſed by the enemy and put to flight.

In the meantime, the empire of Siam fell into great diſtractions; the king, together with the heir to the crown, were murdered by the queen, who had fallen in love with an officer, whom ſhe married after her huſband's death. However, both of them were ſoon after killed at an entertainment; and the crown was given to a natural brother of the late king, but a coward and a tyrant. On this Mandara reſolved to invade the country; and, his principal courtiers concurring in the ſcheme, he collected an army of 800,000 men, with no fewer than 20,000 elephants. In this army were 1000 Portugueſe, commanded by one James Suarez, who already had a penſion of 200,000 ducats a-year from the king of Pegu, with the title of his brother, and governor of the kingdom. With this formidable army he ſet out in April 1548. His firſt atchievement was the taking of a fortreſs on the borders of the enemy's country; before which, being ſeveral times repulſed, and having loſt 3000 of his men, he revenged himſelf by putting all the women to the ſword. He next beſieged the capital itſelf; but though the ſiege was continued for five months, during which time the moſt violent attacks were made upon it, the aſſailants were conſtantly repulſed with great loſs. However, it was ſtill reſolved to continue the ſiege; and a mount of earth was raiſed, on which were placed 40 pieces of cannon, ready to batter it anew, when, in October, advice was received of a rebellion having broke out in Pegu.

The perſon who headed the rebels on the preſent occaſion was Shoripam Shay, near akin to the former monarch ſlain 12 years before. He was a religious perſon, of great underſtanding, and eſteemed a ſaint. As he was a famous preacher, he made a ſermon, in which he ſet forth the tyranny of the Birmans in ſuch a manner, that he was immediately taken out of the pulpit, and proclaimed king by the people, who, as a token of ſovereignty, gave him the title of *Shemindoo*. The firſt act of ſovereignty which he exerted was to cut in pieces 15,000 Birmans, and ſeize on the treaſure; and ſo agreeable was this change of government to all ranks of people, that in three weeks time all the ſtrongholds of Pegu fell into his hands.

On this news the king immediately raiſed the ſiege in which he was engaged, and in 17 days got to Martavan. Here he was informed, that Shemindoo had poſted 500,000 men in different places, in order to intercept his paſſage; at the ſame time that he had the mortification to find 50,000 of his beſt troops deſerted. To prevent a greater deſertion, after 14 days ſtay, he departed from Martavan, and ſoon met Shemindoo at the head of 600,000 men. A deſperate engagement followed; in which Shemindoo was entirely defeated, with the loſs of 300,000 men. Of the Birman troops were ſlain 60,000; among whom were 280 Portugueſe.

The morning after this victory, the tyrant marched to the city; the inhabitants of which ſurrendered, on condition of having their lives and effects ſpared. The kingdom being thus again brought under his ſubjection, his next ſtep was to puniſh the principal perſons concerned in the rebellion: their heads he cut off, and confiſcated their eſtates, which amounted to no leſs than ten millions of gold. Others ſay, that he put all without diſtinction to the ſword, excepting only 12,000, who took ſhelter in James Suarez's houſe; that alone affording an aſylum from the general ſlaughter. The plunder was incredible, Suarez alone getting three millions. All theſe cruelties, however, were inſufficient to ſecure the allegiance of the tyrant's ſubjects: for in leſs than three months news was brought that the city of Martavan had revolted; and that the governor had not only declared for Shemindoo, but murdered 2000 Birmans. Mandara then ſummoned all the lords of the kingdom to meet him with their force, within 15 days, at a place called *Mouchau*, not far from his capital, whither he himſelf went with 300 men, to wait their arrival. But in the meantime he received intelligence that the ſhemin or governor of *Zatan*, a city of ſome conſequence, had ſubmitted to Shemindoo, and alſo lent him a large ſum of gold. The ſhemin was immediately ſent for in order to be put to death: but he, ſuſpecting Mandara's deſign, excuſed himſelf by pretending ſickneſs; after which, having conſulted with his friends, he drew together about 600 men; and having with theſe privately advanced to the place where the king was, he killed him, with the few attendants that were about him at the time. The guards in the court being alarmed with the noiſe, a ſkirmiſh enſued with the ſhemin's men, in which about 800 were ſlain on both ſides, moſt of them Birmans. The ſhemin then retreated to a place called *Pontel;* whither the people of the country, hearing of the death of the king, who was univerſally hated, reſorted to him. When he had aſſembled about 5000 men, he returned to ſeek the troops which the late king had with him; and finding them diſperſed in ſeveral places, eaſily killed them all. With the Birmans were ſlain 80 out of 300 Portugueſe. The remainder ſurrendered, with Suarez their leader; and were ſpared, on condition of their remaining in the ſervice of the ſhemin.

The ſhemin, now finding his forces daily increaſe, aſſumed the title of *king;* and, to render himſelf the more popular, gave out that he would exterminate the Barmas ſo effectually, as not to leave one in all the kingdom. It happened, however, that one of thoſe who were with the late king at the time he was murdered, eſcaped the general ſlaughter; and, ſwimming over the river, informed Chaumigrem of the king's death. He had with him 180,000 men, all of them natives of Pegu, excepting 30,000 Barmas. He knew very well, that if the natives had known that the king was dead, he and all his Barmas would have inſtantly been put to the ſword. Pretending, therefore, that he had received orders to put garriſons into ſeveral places, Chaumigrem diſpatched all the natives into different parts; and thus got rid of thoſe whom he had ſo much cauſe to fear. As ſoon as they were marched, he turned back upon the capital, and ſeized the king's treaſure, together with all the arms and ammunition. He then ſet fire to the magazines, arſenals, palace, ſome of whoſe apartments were ceiled with gold, and 2000 rowing veſſels which were on the river. Then deſtroying all the artillery, he fled with the 30,000 Barmas to his own country, being purſued in vain by the natives of Pegu.

Thus the ſhemin of Zatan was left in quiet poſſeſſion of the kingdom; but, by his repeated acts of tyranny and cruelty, he ſo diſguſted his ſubjects, that many fled to foreign countries, while others went over to Shemindoo, who began now to gather ſtrength again. In the mean time, James Suarez, the Portugueſe whom we have often mentioned, loſt his life by attempting to raviſh a young woman of diſtinction; the ſhemin being unable to protect him, and obliged to give him up to the mob, who ſtoned him to death. The ſhemin himſelf did not long ſurvive him; for, being grown intolerable by his oppreſſions, moſt of his followers abandoned him, and he was beſieged in his capital by Shemindoo with an army of 200,000 men, and ſoon after ſlain in a ſally: ſo that Shemindoo now ſeemed to be fully eſtabliſhed on the throne. But in the mean time Chaumigrem, the foſter brother to the deceaſed king, hearing that Pegu was very ill provided with the means of defence, invaded the kingdom with an army of 300,000 men. Shemindoo met him with three times their number; but his men, being all natives of Pegu, were inferior in ſtrength, notwithſtanding their numbers, to the enemy. The conſequence was, that Shemindoo was defeated with prodigious ſlaughter, and Chaumigrem cauſed himſelf to be proclaimed king of Pegu. Shortly after, Shemindoo himſelf was taken; and, after being treated with the utmoſt cruelty, was beheaded.

The hiſtory of Chaumigrem is very imperfect. However, we know that he was a very great conqueror, and not at all inferior in cruelty to his predeceſſors. He reduced the empire of Siam and Aracan, and died in 1583; being ſucceeded by his ſon named *Pranjinoko*, then about 50 years of age. When this prince aſcended the throne, the kingdom of Pegu was in its greateſt height of grandeur; but by his tyranny and obſtinacy he loſt all that his father had gained. He died in 1599, and after his death the kingdom of Pegu became ſubject to Aracan. For ſome time paſt it has been tributary to the more powerful kingdom of Ava; the ſovereigns of which country have hitherto been extremely cautious of permitting Europeans to obtain any ſettlement among them.

The air of Pegu is very healthy, and preſently recovers ſick ſtrangers. The ſoil alſo is very rich and fertile in corn, rice, fruit, and roots; being enriched by the inundations of the river Pegu, which are almoſt incredible, extending above 20 leagues beyond its channel. It produces alſo good timber of ſeveral kinds. The country abounds with elephants, buffaloes, goats, hogs, and other animals, particularly game; and deer is ſo plenty in September and October, that one may be bought for threepence or fourpence: they are very fleſhy, but have no fat. There is ſtore of good poultry; the cocks are very large, and the hens very beautiful. As for fiſh, there are many ſorts, and well taſted. In Pegu are found mines, not only of gold, iron, tin, and lead, or rather a kind of copper or mixture of copper and lead, but alſo of rubies, diamonds, and ſapphires. The rubies are the beſt in the world; but the diamonds are ſmall; and it is ſaid they are ſometimes found in the craws of poultry. Beſides, only one family has the privilege of ſeeking them; and none dare open the ground to dig for them. The rubies are found in a mountain in the province of Kablan, or Kapelan, between the city of Pegu and the port of Sirian.

But for a fuller account of Pegu, and the Birman empire, ſee Asia, from p. 742 to p. 760; and for a deſcription of the temple of Shoemadoo, of which we have given an engraving, taken from Syme's Embaſſy to that kingdom, ſee alſo Asia, p. 751. Plate CCCCVII.

PEGUNTIUM, in *Ancient Geography*, (Ptolemy); *Piguntiæ*, (Pliny); a town or citadel of Dalmatia, on the Adriatic, oppoſite to the iſland Brattia, ſcarcely five miles off, and 40 miles to the eaſt of Salonæ. According to Fortis, a mountain, a large hollow, and ſubmarine ſprings are ſeen here. *Travels in to Dalmatia.* "This hollow (ſays he) ſeems to have been excavated by ſome ancient river. The ſprings which bubble up from under the ſea are ſo conſiderable, that they might paſs for the riſing again of a river ſunk under ground. Vrullia has the ſame derivation as the word *Vril*, which in Sclavonian ſignifies a fountain; and this etymology, rendering the name of Vrullia the *Berullia* of Porphyrogenitus analogous to that of Peguntium, ſince *Πεγο* and Vril are ſynonymous, induces me to believe, that the caſtle named Peguntium by ancient geographers was ſituated in this place, and not at the mouth of the Cettina. No remarkable veſtiges of antiquity now exiſt on the ſpot; yet it is evident, by the quantity of fragments of vaſes, tiles, and ſepulchral inſcriptions now and then dug up, that this tract of coaſt was well inhabited in the Roman times. The principal cauſe why the tracts of ancient habitations cannot be diſcovered about Vrullia, is the ſteepneſs of the hill above it, and the quantity of ſtones brought down from thence by the waters. The mouth of the hollow of Vrullia is dreaded by ſeamen, on account of the ſudden impetuous guſts of wind that blow from thence, and in a moment raiſe a kind of hurricane in the channel between the Primorie and the iſland of Brazza, to the great danger of barks ſurpriſed by it."

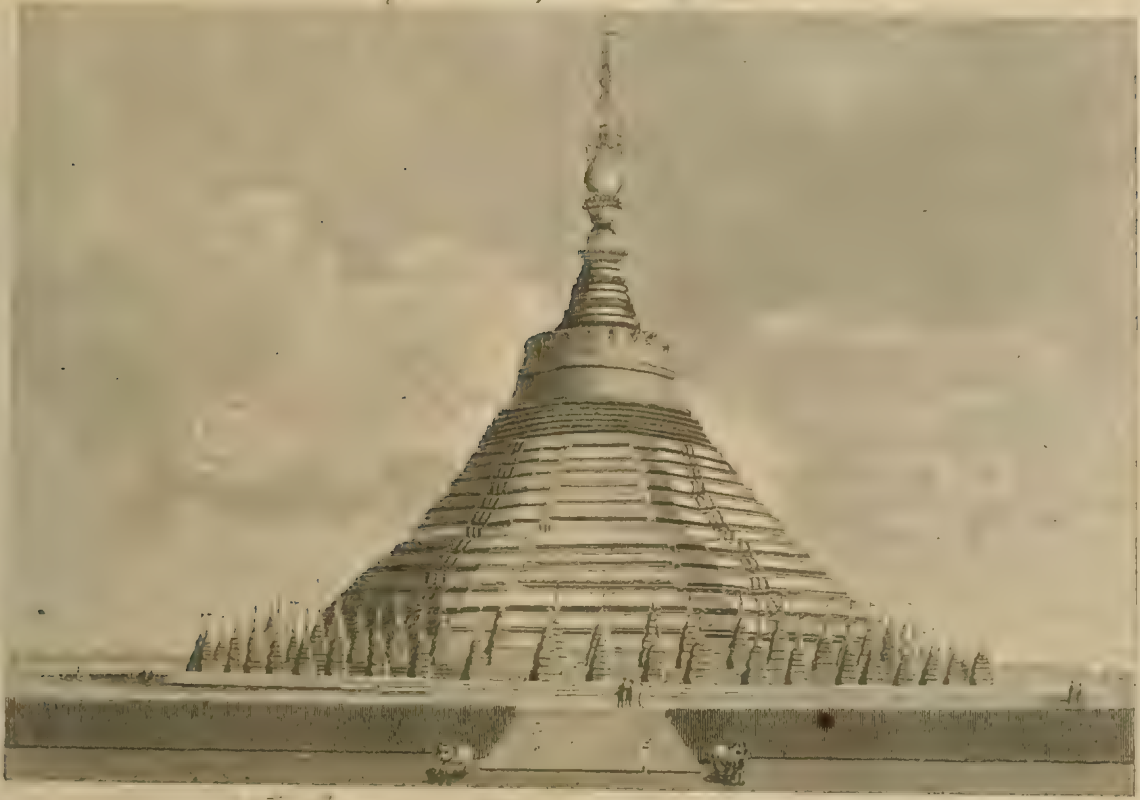
PEINE FORTE ET DURE, (Lat. *pœna fortis et dura*), ſignifies a ſpecial puniſhment inflicted on thoſe who, being arraigned of felony, refuſe to put themſelves on the ordinary trial, but ſtubbornly ſtand mute; it is vulgarly called *preſſing to death*. See Arraignment.

PEIRCE, James, an eminent diſſenting miniſter, was born at Wapping, in London, in the year 1674, and was educated at Utrecht and Leyden; after which he ſpent ſome time at Oxford, in order to enjoy the benefit of frequenting the Bodleian library. He then for two years preached the Sunday-evening's lecture at the meeting-houſe in Miles-Lane, London, and then ſettled at Cambridge. In 1713 he was removed to a congregation at Exeter, where he continued till the year 1718: when the Calviniſts among the diſſenters propoſing a ſubſcription to articles of faith to be ſigned by all the diſſenting miniſters in the kingdom, ſeveral articles were propoſed to him and Mr John Hallet, another diſſenting miniſter at Exeter, in order to their ſubſcribing them, they both refuſed, imagining this proceeding of their diſſenting brethren to be an unworthy impoſition on religious liberty and private judgement; and for this they were ejected from their congregation. Upon this, a new meeting was opened for them at Exeter, of which Mr Peirce continued miniſter till his death, in 1726. He was a man of the ſtricteſt virtue, exemplary piety, and great learning. He wrote, 1. *Exercitatio philoſophica de Homœmeria Anaxagorea*. 2. Thirteen pieces on the Controverſy between the Church of England and the Diſſenters. 3. Ten pieces on the Controverſy about the Ejectment at Exeter. 4. Six pieces on the Doctrine of the Trinity. 5. A Paraphraſe and Notes on the Epiſtles of St Paul to the Coloſſians, Philippians, and Hebrews. 6. An Eſſay in favour of giving the Euchariſt to Children. 7. Fourteen Sermons.

PEIRESC, Nicolas Claude Fabri, born in 1580, was deſcended from an ancient and noble family, ſeated originally at Piſa in Italy. At ten years of age, he was ſent to Avignon, where he ſpent five years in the Jeſuits college, in the ſtudy of what in Scotland and on the Continent is called *humanity*. From Avignon he was, in 1595, removed to Aix, and entered upon the ſtudy of philoſophy. In the interim, he attended the proper maſters for dancing, riding, and handling arms; in all which, though he performed the leſſons regularly, it was with reluctance: for this being done only to pleaſe an uncle, whoſe heir he was to be, he never practiſed by himſelf, eſteeming all the time loſt that was not ſpent in the purſuits of literature. During this period, his father being preſented with a medal of the emperor Arcadius, which was found at Belgenſer, Peireſc begged the favour of it; and, charmed with deciphering the characters in the exergue, and reading the emperor's name, he carried the medal with a tranſport of joy to his uncle; who for his encouragement gave him two more, together with ſome books upon the ſubject. This is the epoch of his application to antiquities, for which he became afterwards ſo famous. In 1596, he was ſent to finiſh his courſe of philoſophy under the Jeſuits at Tournon, where he turned his attention particularly to coſmography, as being neceſſary to the underſtanding of hiſtory, abating, however, nothing of his application to antiquity, in which he was aſſiſted by Petrus Rogerus, one of the profeſſors, and a ſkilful medaliſt: nor did he omit the ſtudy of humanity in general, wherein he was the maſter and inſtructor of a brother who was with him. But to do all this he was obliged to ſit up late at nights; and ſo much labour and attention, as he was naturally of a tender conſtitution, increaſed the weakneſs of his ſtomach formerly contracted, and for which he had uſed a kind of digeſtive powder. Being recalled by his uncle in 1597, he returned to Aix, and entered there upon the ſtudy of the law; which he proſecuted, however, ſo as to find leiſure to viſit and converſe frequent-

SHOEMADOO

The great Temple at Pegue



The Geometrical Pen.

Fig 2

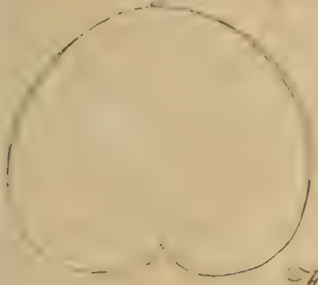


Fig. 3.

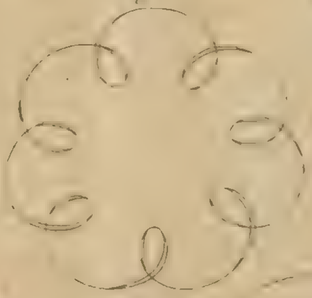


Fig. 4.

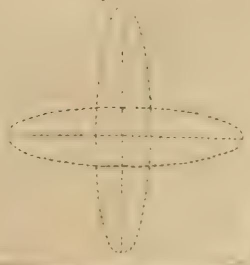
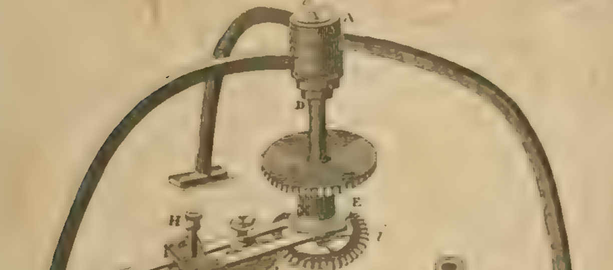


Fig. 1.



The Fountain Pen

Fig 3.

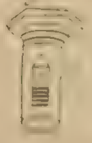


Fig. 2

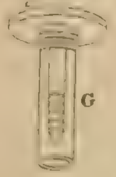
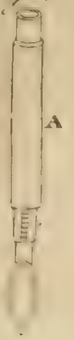


Fig. 1.



[illegible] sculpsit

ly with Peter A. R. Bagarr, a moſt ſkilful antiquary, who was afterwards made maſter of the jewels to Henry IV.

The following year he went again to Avignon, to carry on his courſe of law under one Peter David; who, being well ſkilled likewiſe in antiquities, was pleaſed to ſee Peireſc join this ſtudy to that of the law. But Gualterus of Naples, ſecretary to Cardinal Aquaviva, fed his curioſity the moſt, in ſhewing him ſome rarities, ſuch as he had never ſeen before. Gualterus alſo lent him Goltzius's Treatiſe upon Coins, and adviſed him to go into Italy, eſpecially to Rome, where he would meet with curioſities to ſatisfy his moſt ardent wiſhes. Accordingly, his uncle having procured a proper governor, he and his brother ſet out upon that tour September 1599; and paſſing through Florence, Bononia, and Ferrara, when he had ſtaid a few days at Venice, he fixed his reſidence at Padua, in order to complete his courſe of law. But once a quarter, going to Venice to get caſh for bills of exchange, he took theſe opportunities of introducing himſelf to the moſt diſtinguiſhed literati there; and was particularly careſſed by F. Contarin, procurator of St Mark, who was poſſeſſed of a curious cabinet of medals, and other antiquities, without knowing the value of them. This was fairly ſhown to him by Peireſc, who likewiſe explained the Greek inſcriptions upon his medals, and the monumental ſtones. After a year's ſtay at Padua, he ſet out for Rome, and arrived there October 1600, in order to be in time for ſeeing the jubilee: to celebrate which, the Porta Santa would be opened in the beginning of the next year. He paſſed ſix months in this city, viewing the numberleſs curioſities there, and in cultivating the friendſhip of Galileo, by whom he was much beloved. This friendſhip led him to carry his reſearches into aſtronomy and natural philoſophy; and he was preſent when Fabricius ab Aquapendente, out of a parcel of eggs upon which a hen was ſitting, took one every day, to obſerve the gradual formation of the chick from firſt to laſt. From this time it was generally acknowledged, that he had taken the helm of learning into his hand, and began to guide the commonwealth of of letters.

Having now ſpent almoſt three years in Italy, he began to prepare for his departure; and in the end of 1602, having packed up all the rarities, gems, &c. which he had procured, and put them into the road to Marſeilles, he left Padua, and croſſing the Alps to Geneva, went to Lyons; where receiving money he made a handſome preſent to his governor, who took the route of Paris. From Lyons he went to Montpelier, to improve himſelf in the law under Julius Parius. From Montpelier he diſpatched more rarities to his uncle, who calling for him home, he arrived at Aix in November; and, bringing Parius along with him, he obtained leave to return to Montpelier in a few days. He waited upon Parius back again, under whom he continued purſuing his law ſtudies till the end of 1603, when he returned to Aix, at the earneſt requeſt of his uncle, who, having reſigned to him his ſenatorial dignity, had ever ſince the beginning of the year laboured to get the king's patent. The degree of doctor of law was a neceſſary qualification for that dignity. Peireſc, therefore, having kept the uſual exerciſes, took that degree Jan. 18. 1604, when the aforeſaid patent was given in to the ſenate, and ordered to be recorded. Yet Peireſc procured leave not to be preſently entered into the liſt of ſenators. The bent of his inclination was not ſo much to buſineſs as to advance arts and ſciences, and to aſſiſt all the promoters of learning. For this purpoſe, he reſolved to lead a ſingle life; ſo that when his father had concluded a match for him with a reſpectable lady, he begged to be excuſed.

In 1605, he accompanied G. Varius, firſt preſident of the ſenate at Aix, who was very fond of him, to Paris: whence, having viſited every thing curious, he croſſed the water, in company with the king's ambaſſador, 1606, to England. Here he was very graciouſly received by king James I.; and having ſeen Oxford, and viſited Camden, Sir Robert Cotton, Sir Henry Saville, and other learned men, he paſſed over to Holland; and after viſiting the ſeveral towns and univerſities, with the literati in each, he went through Antwerp to Bruſſels, and thence back to Paris, to ſee the ceremony of the Dauphin's baptiſm; which being ſolemnized Auguſt 24. he returned home in September 1606, being expected for the ordering of the family affairs.

Preſently after this, he purchaſed the barony of Rians: and at the ſolicitation of his uncle, having approved himſelf before that aſſembly, he was received a ſenator on the 1ſt of July 1607. January 1608 he loſt his uncle; and the following year, falling himſelf into a dangerous fever, recovered by eating muſk-melons before ſupper, for which he had conceived a longing. He was ordered by his phyſician to eat them before his meals without bread, and to drink a glaſs of pure wine upon them. He continued this method all his life afterwards; and grew ſo fond of them, that, though he could abſtain from any other meat as he liſted, yet towards them he profeſſed he was unable to maſter himſelf. He frequently experienced, that in the muſk-melon ſeaſon he was never troubled with the gravel. In 1618, having procured a faithful copy of "the Acts of the Monaſtery of Maren in Switzerland," he publiſhed a ſecond edition of that work. As it was written in defence of the royal line of France againſt Theodoric Pieſpordius, who had attempted to prove the title of the Auſtrian family to the French crown by right of ſucceſſion, he was, upon this publication, nominated the ſame year, by Louis XIII. abbot of Sancta Maria Aquiſtrienſis. He ſtayed in France till 1623; when, upon a meſſage from his father, now grown old and ſickly, he left Paris, where he had ſpent ſeven years and ſome months. He arrived at Aix in October; and not long after preſented to the court a patent from the king, permitting him to continue in the function of his ancient dignity, and to exerciſe the office of a ſecular or lay perſon, notwithſtanding that, being an abbot, he had aſſumed the character of a churchman. To this the court of parliament not aſſenting, decreed unanimouſly, that, being already admitted into the firſt rank, he ſhould abide perpetually therein; not returning, as the cuſtom of the court was, to the inferior auditory, wherein trials are uſually had of criminal caſes. In 1625, he buried his father, who had been long afflicted with the gout. In 1627, he prevailed with the archbiſhop of Aix to eſtabliſh a poſt thence to Lyons, and ſo to Paris and all Europe; by which the correſpondence conſtantly held with the literati everywhere was much facilitated. In 1629, he began to be much tormented with the ſtrangury and hæmorrhoides; and in 1631, having completed the marriage of his nephew Claudius with Margaret Alreſia, a noblewoman of the county of Avignon, he beſtowed upon him the barony of Rianty, together with a grant of his ſenatorial dignity, only reſerving the function to himſelf for three years. But the parliament not waiting his ſurrendry of it, he reſented that affront ſo heinouſly, that he procured, in 1635, letters patent from the king to be reſtored, and to exerciſe the office for five years longer, which happened to be till his death: for being ſeized, June 1637, with a fever that brought on a ſtoppage of urine, this put an end to his life on the 24th of that month, in his 57th year.

The character of Peireſc may be ſummed up in a few words. His perſon was of a middle ſize, and of a thin habit: his forehead large, and his eyes gray; a little hawk-noſed; his cheeks tempered with red; the hair of his head yellow, as alſo his beard, which he uſed to wear long; his whole countenance bearing the marks of uncommon and rare courteſy and affability. In his diet he affected cleanlineſs, and in all things about him; but nothing ſuperfluous or coſtly. His clothes were ſuitable to his dignity; yet he never wore ſilk. In like manner, the reſt of his houſe was adorned according to his condition, and very well furniſhed; but he neglected his own chamber. Inſtead of tapeſtry, there hung the pictures of his chief friends and of famous men, beſides innumerable bundles of commentaries, tranſcripts, notes, collections from books, epiſtles, and ſuch like papers. His bed was exceedingly plain, and his table continually loaded and covered with papers, books, letters, and other things; as alſo all the ſeats round about, and the greateſt part of the floor. Theſe were ſo many evidences of the turn of his mind; in reſpect to which, the writer of his eulogy compares him to the Roman Atticus; and Bayle, conſidering his univerſal correſpondence and general aſſiſtance to all the literati in Europe, daſhed it out luckily enough, when he called him "the attorney general of the literary republic." The works which he publiſhed are, "Hiſtoria provinciæ Galliæ Narbonenſis;" "Nobilium ejuſdem provinciæ familiarum Origines, et ſeparatim Fabriciæ;" "Commentarii rerum omnium memoria dignarum ſua ætate geſtarum;" "Liber de ludicris naturæ operibus;" "Mathematica et aſtronomica varia;" "Obſervationes mathematicæ;" "Epiſtolæ ad S. P. Urbanum VIII. cardinales Barberinos, &c.;" "Authores antiqui Græci et Latini de ponderibus et menſuris;" "Elogia et epitaphia;" "Inſcriptiones antiquæ et novæ;" "Genealogia domus Auſtriacæ;" "Catalogus librorum biblioth. reg.;" "Poemata varia;" "Nummi Gallici, Saxonici, Britannici, &c.;" "Linguæ orientales, Hebræa, Samaritana, Arabica, Ægyptiaca, et Indices librorum harum linguarum;" "Obſervationes in varios auctores." It is remarkable, that though Peireſc bought more books than any man of his time, yet his collection left was not large. The reaſon was, that, as faſt as he purchaſed, he kept continually making preſents of them to ſuch learned men as he knew they would be uſeful to.

Gaſſendi's Life of Peireſc, in Engliſh. Lond. 1657.

PEKIN, the capital city of the empire of China, in Aſia, where the emperor generally reſides. It is ſituated in a very fertile plain, 20 leagues diſtant from the great wall. This name, which ſignifies the *northern court*, is given to it, to diſtinguiſh it from another conſiderable city called *Nanking*, or the *ſouthern court.* The emperor formerly reſided in the latter; but the Tartars, a reſtleſs and warlike people, obliged this prince to remove his court to the northern provinces, that he might more effectually repel the incurſions of thoſe barbarians, by oppoſing to them a numerous militia which he generally keeps around his perſon. It is an exact ſquare, and divided into two parts; namely, that which contains the emperor's palace, which is in the new city, or, as it is called, the Tartar's city, becauſe it is inhabited by Tartars ever ſince they conquered this empire; the other, called the *Old City*, is inhabited by the Chineſe. The circuit of both theſe together is 52 Chineſe lys, each of which contains 240 geometrical paces; being, without the ſuburbs, full ſix leagues in circumference, according to the moſt accurate meaſurement made by order of the emperor.

Thoſe who have paid attention to the population of this place, reckon the number of inhabitants at 2,000,000; but we learn from Sir George Staunton, in his account of the late embaſſy to China, that the population of this prodigious city is not leſs than 3,000,000.

Groſier tells us, "that the height and enormous thickneſs of the walls of the Tartar city excite admiration; twelve horſemen might eaſily ride abreaſt upon them; they have ſpacious towers raiſed at intervals, a bow-ſhot diſtant from one another, and large enough to contain bodies of reſerve in caſe of neceſſity. The city has nine gates, which are lofty and well arched. Over them are large pavilion-roofed towers divided into nine ſtories, each having ſeveral apertures or portholes: the lower ſtory forms a large hall for the uſe of the ſoldiers and officers who quit guard, and thoſe appointed to relieve them. Before each gate a ſpace is left of more than 360 feet: this is a kind of place of arms, incloſed by a ſemicircular wall equal in height and thickneſs to that ſurrounding the city. The great road, which ends here, is commanded by a pavilion-roofed tower like the firſt, in ſuch manner, that, as the cannon of the former can batter the houſes of the city, thoſe of the latter can ſweep the adjacent country. The ſtreets of Pekin are ſtraight, about 120 feet wide, a full league in length, and bordered with ſhops. It is aſtoniſhing to ſee the immenſe concourſe of people that continually fills them, and the confuſion cauſed by the prodigious number of horſes, camels, mules, and carriages, which croſs or meet each other. Beſides this inconvenience, one is every now and then ſtopped by crowds, who ſtand liſtening to fortune-tellers, jugglers, ballad-ſingers, and a thouſand other mountebanks and buffoons, who read and relate ſtories calculated to promote mirth and laughter, or diſtribute medicines, the wonderful effects of which they explain with all the eloquence peculiar to them.

Groſier's Deſcripti of China.

"People of diſtinction oblige all their dependents to follow them. A mandarin of the firſt rank is always accompanied in his walks by his whole tribunal; and, to augment his equipage, each of the inferior mandarins in his ſuit is generally attended by ſeveral domeſtics. The nobility of the court, and princes of the blood, never appear in public without being ſurrounded by a large body of cavalry; and, as their preſence is required at the palace every day, their train alone would be ſufficient to create confuſion in the city. It is very ſingular, that in all this prodigious concourſe no women are ever ſeen: hence we may judge how great the population of China muſt be, ſince the number of females in this country, as well as everywhere elſe, is ſuperior to that of the other ſex.

"As there is a continual influx of the riches and merchandize of the whole empire into this city, the number of ſtrangers that reſort hither is immenſe. They are carried in chairs, or ride on horſeback; the latter is more common: but they are always attended by a guide, acquainted with the ſtreets, and who knows the houſes of the nobility and principal people of the city. They are alſo provided with a book, containing an account of the different quarters, ſquares, remarkable places, and of the reſidence of thoſe in public offices. In ſummer there are to be ſeen ſmall temporary ſhops, where people are ſerved with water cooled by means of ice; and one finds everywhere eating-houſes, with refreſhments of tea and fruits. Each kind of proviſion has a certain day and place appointed for its being expoſed to ſale.

"The governor of Pekin, who is a Mantchew Tartar, is ſtyled Governor of the Nine Gates. His juriſdiction extends not only over the ſoldiers, but alſo over the people in every thing that concerns the police. No police can be more active; and it is ſurpriſing to ſee, among an infinite number of Tartars and Chineſe mixed together, the greateſt tranquillity prevail. It is rare, in a number of years, to hear of houſes being robbed, or people aſſaſſinated. All the principal ſtreets have guard-rooms, and ſoldiers patrole night and day, each having a ſabre hanging from his girdle, and a whip in his hand, to correct, without diſtinction, thoſe who excite quarrels or cauſe diſorder. The lanes are guarded in the ſame manner; and have latticed gates, which do not prevent thoſe from being ſeen who walk in them: they are always kept ſhut during the night, and ſeldom opened even to thoſe who are known; if they are, the perſon to whom this indulgence is granted muſt carry a lanthorn, and give a ſufficient reaſon for his going out. In the evening, as ſoon as the ſoldiers are warned to their quarters by beat of drum, two centinels go and come from one guard-room to another, making a continual noiſe with a kind of caſtanet, to ſhow that they are not aſleep. They permit no one to walk abroad in the night-time. They even examine thoſe whom the emperor diſpatches on buſineſs; and if their reply gives the leaſt cauſe of ſuſpicion, they have a right to convey them to the guard-room. The ſoldiers in each of the guard-rooms are obliged to anſwer every time the centinels on duty call out.

"It is by theſe wiſe regulations, obſerved with the greateſt ſtrictneſs, that peace, ſilence, and ſafety reign throughout the whole city. The governor is alſo obliged to go the round; and the officers ſtationed on the walls, and in the towers over the gates (in which are kept large kettle-drums that are beat every time the guard is relieved), are continually diſpatching ſubalterns to examine the quarters belonging to the gates where they are poſted. The leaſt neglect is puniſhed next morning, and the officer who was on guard is caſhiered. This police, which prevents nocturnal aſſemblies, would appear no doubt extraordinary in Europe, and in all probability would not be much reliſhed by our young men of fortune and ladies of quality. But the Chineſe think juſtly: they conſider it to be the duty of the magiſtrates of a city to prefer good order and public tranquillity to vain amuſements which generally occaſion many attempts againſt the lives and property of the citizens. It is true, the ſupport of this police coſts the emperor a great deal; for part of the ſoldiers we have mentioned are maintained for this purpoſe only. They are all infantry, and their pay is generally very high. Their employment conſiſts not only in watching for thoſe who may occaſion diſturbance in the day-time, or walk abroad during the night; they muſt alſo take care that the ſtreets are kept clean and ſwept every day; that they are watered morning and evening in time of dry weather; and that every nuiſance is removed. They have orders alſo to aſſiſt in this labour themſelves; and to clear the kennels, that the water may have a free courſe."

The walls of the emperor's palace, including that and the gardens, are about two miles in length. "Although (ſays Groſier) the Chineſe architecture has no reſemblance to that of Europe, the imperial palace of Pekin does not fail to ſtrike beholders by its extent, grandeur, and the regular diſpoſition of its apartments, and by the ſingular ſtructure of its pavilion-roofs, ornamented at each corner with a carved plat-band, the lower extremity of which is turned upwards. Theſe roofs are covered with varniſhed tiles of ſo beautiful a yellow colour, that, at a diſtance, they make as ſplendid an appearance as if they were gilded. Below the upper roof there is another of equal brilliancy, which hangs ſloping from the wall, ſupported by a great number of beams, daubed over with green varniſh, and interſperſed with gilt figures. This ſecond roof, with the projection of the firſt, forms a kind of crown to the whole edifice. The palace is a ſmall diſtance from the ſouth gate of the Tartar city. The entrance to it is through a ſpacious court, to which there is a deſcent by a marble ſtaircaſe, ornamented with two large copper lions, and a baluſtrade of white marble. This baluſtrade runs in the form of a horſe-ſhoe, along the banks of a rivulet, that winds acroſs the palace with a ſerpentine courſe, the bridges over which are of marble. At the bottom of this firſt court ariſes a façade with three doors: that in the middle is for the emperor only; the mandarins and nobles paſs through thoſe on each ſide. Theſe doors conduct to a ſecond court, which is the largeſt of the palace: it is about 300 feet in length, and 50 in breadth. An immenſe gallery runs round it, in which are magazines, containing rich effects, which belong to the emperor as his private property; for the public treaſure is entruſted to a ſovereign tribunal called *Houpou*. The firſt of theſe magazines is filled with plate and veſſels of different metals; the ſecond contains the fineſt kinds of furs; the third, dreſſes lined with ſable, ermine, minever, and foxes ſkins, which the emperor ſometimes gives in preſents to his officers; the fourth is the depoſitory of jewels, pieces of curious marble, and pearls fiſhed up in Tartary; the fifth, conſiſting of two ſtories, is full of wardrobes and trunks, which contains the ſilk ſtuffs uſed by the emperor and his family; the reſt are filled with bows, arrows, and other pieces of armour taken from the enemy or preſented by different princes.

"The royal hall, called *Tai-ho-tien*, or the Hall of the Grand Union, is in this ſecond court. It is built upon a terrace about 18 feet in height, incruſted with white marble, and ornamented with baluſtrades of excellent workmanſhip. Before this hall all the mandarins range themſelves, when they go, on certain days, to renew their homage, and perform theſe ceremonies that are appointed by the laws of the empire. This hall is almoſt ſquare, and about 130 feet in length. The ceiling is carved, varniſhed green, and loaded with gilt dragons. The pillars which ſupport the roof within are ſix feet in circumference towards the baſe, and are coated with a kind of maſtich varniſhed red; the floor is partly covered with coarſe carpets, after the Turkiſh manner; but the walls have no kind of ornament, neither tapeſtry, luſtres, nor paintings.

"The throne, which is in the middle of the hall, conſiſts of a pretty high alcove, exceedingly neat. It has no inſcription but the character *ching*, which the authors of this relation have interpreted by the word *holy*: but it has not always this ſignification; for it anſwers better ſometimes to the Latin word *eximius*, or the Engliſh words *excellent*, *perfect*, *moſt wiſe*. Upon the platform oppoſite to this hall ſtand large veſſels of bronze, in which incenſe is burnt when any ceremony is performing. There are alſo chandeliers ſhaped like birds and painted different colours, as well as the wax-candles that are lighted up in them. This platform is extended towards the north, and has on it two leſſer halls; one of them is a rotunda that glitters with varniſh, and is lighted by a number of windows. It is here that the emperor changes his dreſs before or after any ceremony. The other is a ſaloon, the door of which opens to the north: through this door the emperor muſt paſs, when he goes from his apartment to receive on his throne the homage of the nobility; he is then carried in a chair, by officers dreſſed in long red robes bordered with ſilk, and caps ornamented with plumes of feathers. It would be difficult to give an exact deſcription of the interior apartments which properly form the palace of the emperor, and are ſet apart for the uſe of his family. Few are permitted to enter them but women and eunuchs."

The temples and the towers of this city are ſo numerous, that it is difficult to count them. Proviſions of all kinds are exceeding plentiful, they being, as well as the merchandiſes, brought from other parts by means of canals cut from the rivers, and always crowded with veſſels of different ſizes, as well as from the adjacent country. An earthquake which happened here in 1731 buried above 100,000 perſons in the ruins of the houſes which were thrown down. E. Long. 116. 41. N. Lat. 39. 54.

We have already, under the article OBSERVATORY, mentioned the famous obſervatory in this city, of which we ſhall give this further account from the Univerſal Hiſtory. "The Chineſe had thought nothing in the univerſe could equal in magnificence this famous place; and one of the moſt celebrated mathematicians of the royal academy of Paris hath made no ſcruple to repreſent it as one of the greateſt prodigies of art and ingenuity, of beauty and magnificence; and yet, when this celebrated ſtructure came to be viewed by more proper and unbiaſſed judges, it appears to have been of little worth as to its ancient machines, and leſs as to its ſituation; and that all that is now valuable in it is owing to the improvements made by Father Verbieſt a Flemiſh Jeſuit, who cauſed a new ſet of inſtruments to be made, with extraordinary care, neatneſs, and preciſion.

Mod. Un. Hiſt. vol. 7.

"This fabric ſtands in a court of a moderate extent, and is built in the form of a ſquare tower, contiguous to the city wall on the inſide, and raiſed but ten or twelve feet above its bulwark. The aſcent up to the top is by a very narrow ſtaircaſe; and on the platform above were placed all the old inſtruments, which, though but few, took up the whole room, till Father Verbieſt introduced his new apparatus, which he diſpoſed in a more convenient order. Theſe are large, well caſt, and embelliſhed; and were the neatneſs of the diviſions anſwerable to the work, and the teleſcopes faſtened to them according to the new method, they would be equal to thoſe of Europe; but the Chineſe artificers were, it ſeems, either too negligent, or incapable of following his directions. As to the old inſtruments, they were, by order of the emperor Kang-hi, ſet aſide as uſeleſs, and laid in the hall near the tower, where they may be ſeen through a croſs-barred window, all covered with ruſt, and buried in oblivion.

"In this famed obſervatory there are five mathematicians employed night and day, each in a proper apartment on the top of the tower, to obſerve all that paſſes over their heads: one of them is gazing towards the zenith, and the others towards the four points of the compaſs, that nothing may eſcape their notice. Their obſervations extend not only to the motions of the heavenly bodies, but to fires, meteors, winds, rain, thunder, hail ſtorms, and other phenomena of the atmoſphere; and theſe are carefully entered in their journals, and an account of them is brought every morning to the ſurveyor of the mathematics, and regiſtered in his office."

PELAGIANS, a Chriſtian ſect who appeared about the fifth or end of the fourth century. They maintained the following doctrines: 1. That Adam was by nature mortal, and, whether he had ſinned or not, would certainly have died. 2. That the conſequences of Adam's ſin were confined to his own perſon. 3. That new-born infants are in the ſame ſituation with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promiſes with the goſpel. 5. That the general reſurrection of the dead does not follow in virtue of our Saviour's reſurrection. 6. That the grace of God is given according to our merits. 7. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty, being ſufficient, &c. The founder of this ſect was

PELAGIUS, a native of Great Britain; but whether of England, Scotland, or Wales, is as uncertain as it is immaterial (A). He was born towards the cloſe of the fourth century and educated in the monaſtery of

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(A) Dr Henry thinks he was born in North Wales; that his real name was Morgan, of which Pelagius is of Banchor, in Wales, of which he became a monk, and afterwards abbot. In the early part of his life he went over to France, and thence to Rome, where he had the inſolence to promulgate certain opinions ſomewhat different from thoſe of the infallible church. His morals being irreproachable, he gained many diſciples; and the dreadful hereſy made ſo rapid a progreſs, that, for the ſalvation of ſouls, it became neceſſary for the pope to exert his power. Pelagius, to avoid the danger, in the year 409 paſſed over to Sicily, attended by his friend and pupil Celeſtius. In 411 they landed in Africa, continued ſome time at Hippo, and were preſent at the famous conference between the Catholics and Donatiſts which was held at Carthage in 412. From thence they travelled into Egypt; and from Egypt, in 415, to Paleſtine, where they were graciouſly received by John biſhop of Jeruſalem. In the ſame year Pelagius was cited to appear before a council of ſeventeen biſhops, held at Dioſpolis. They were ſatisfied with his creed, and abſolved him of hereſy. The African biſhops, however, being diſpleaſed with their proceedings, appealed to the Roman pontiff: he firſt approved, and afterwards condemned, the opinions of Pelagius, who, with his pupil Celeſtius, was publicly excommunicated; and all the biſhops who refuſed to ſubſcribe the condemnation of the Pelagian hereſy were immediately deprived. What became of him after this period is entirely unknown; but it ſeems very probable that he retired to Banchor, and died abbot of that monaſtery. He wrote, 1. *Expoſitionum in epiſt. Paulinas*, lib. xiv. 2. *Epiſtola ad Demetriadem de virginitate*. 3. *Explanationis ſymboli ad Damaſum*. 4. *Epiſtolæ ad viduam duæ*. 5. *De libero arbitrio*. Theſe and many other fragments are ſcattered among the works of St Jerome. They are alſo collected by Garnerius, and publiſhed in Append. op. Mercatoris, p. 373. *Cave*.

PELAGOSA, an iſland in the Adriatic, which, together with ſeveral rocks that appear above water near it, are the remains of an ancient volcano. "I will not aſſure you (ſays Fortis) that it was thrown up out of the ſea like ſeveral other iſlands in the Archipelago, though there is ſome ground to ſuſpect this to have been the caſe; becauſe we find no preciſe mention of it in the moſt ancient geographers. It ſhould ſeem that it ought not to be confuſed with the Diomedee, from which it is 50 miles diſtant; yet it is not impoſſible that they have reckoned it among them. The lava which forms the ſubſtance of this iſland, is perfectly like the ordinary lava of Veſuvius, as far as I could diſcover in paſſing near it. If a naturaliſt ſhould land there, and viſit on purpoſe the higheſt parts of the iſland, perhaps we might then know whether it has been thrown up by a ſubmarine

Travel. into Dalmatia.

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is a tranſlation; and that he was born on the 13th of November A. D. 354, the ſame day with his great antagoniſt St Auguſtin. The ſame learned hiſtorian gives us the following account of Pelagius and his great coadjutor Celeſtius. "He received a learned education in his own country, moſt probably in the great monaſtery of Banchor near Cheſter, to the government of which he was advanced A. D. 404. He was long eſteemed and loved by St Jerome and St Auguſtin, who kept up a friendly correſpondence with him by letters before they diſcovered the heretical pravity of his opinions; for Pelagius, being a cautious and artful man, for ſome time vented his peculiar notions as the ſentiments of others, without diſcovering that they were his own. At length, however, he threw off the maſk, and openly publiſhed and defended his doctrines at Rome about the beginning of the fifth century. This involved him in many troubles, and drew upon him the indignation of his former friends St Jerome and St Auguſtin, who wrote againſt him with great acrimony. He is acknowledged, even by his adverſaries, to have been a man of good ſenſe and great learning, and an acute diſputant, though they load him with the moſt bitter reproaches for his abuſe of theſe talents. His perſonal blemiſhes are painted in very ſtrong colours; and he is repreſented by theſe good fathers, in the heat of their zeal, as a very ugly fellow, 'broad ſhouldered, thick-necked, fat-headed, lame of a leg, and blind of an eye.' Even the moſt northern parts of this iſland (Britain) produced ſome men of learning in this period. Celeſtius, the diſciple and friend of Pelagius, was a Scotſman, who made a prodigious noiſe in the world by his writings and diſputations about the beginning of the fifth century. He defended and propagated the peculiar opinions of his maſter Pelagius with ſo much learning, zeal, and ſucceſs, that thoſe who embraced theſe opinions were frequently called Celeſtians. Before he became acquainted with theſe doctrines he wrote ſeveral books, which were univerſally admired for their orthodoxy, learning, and virtuous tendency. After he had ſpent his youth in his own country in a ſtudious privacy, he travelled for his further improvement to Rome, where he became acquainted with Rufinus and Pelagius, and was by them infected with their hereſies. From that time he became the moſt indefatigable and undaunted champion of theſe hereſies, and thereby brought upon himſelf the indignation of the orthodox fathers of theſe days, who gave him many very bad names in their writings. St Jerome, whoſe commentaries on the Epheſians he had preſumed to criticiſe, calls him, 'an ignorant, ſtupid fool, having his belly ſwelled and diſtended with Scots pottage; a great, corpulent, barking dog, who was fitter to kick with heels than to bite with his teeth; a Cerberus, who, with his maſter Pluto (Pelagius), deſerved to be knocked on the head, that they might be put to eternal ſilence.' Such were the flowers of rhetoric which theſe good fathers employed againſt the enemies of the orthodox faith! But candour obliges us to obſerve, that this was perhaps more the vice of the age in which they lived than of the men. Both Pelagius and Celeſtius were very great travellers; having viſited many different countries of Aſia and Africa, as well as Europe, with a view to elude the perſecutions of their enemies, and to propagate their opinions. It is no inconſiderable evidence of their ſuperior learning and abilities, that their opinions gained great ground in all the provinces both of the eaſtern and weſtern empire, in ſpite of the writings of many learned fathers and the decrees of many councils againſt them. 'The Pelagian and Celeſtian hereſy (ſays Photius) not only flouriſhed in great vigour in the Weſt, but was alſo propagated into the Eaſt.'

rine volcano, as the iſland near Santorini was in our age; or if we ought to believe it the top of ſome ancient volcanic mountain, of which the roots and ſides have been covered by the waters, which divided Africa from Spain, forming the ſtraits of Gibraltar; an invaſion that no one can doubt of who has examined the bottoms and ſhores of our ſea. The Liſſan fiſhermen ſay, that Pelagoſa is ſubject to frequent and violent earthquakes; and the aſpect of the iſland proves at firſt ſight, that it has ſuffered many revolutions; for it is rugged, ruinous, and ſubverted."

PELAIAH, a Levite (Nehem. viii. 7. x. 10.). He was one of the principal Levites that returned from captivity, and was one of thoſe that ſigned the covenant that Nehemiah renewed with the Lord.

PELALIAH, ſon of Amazi and father of Jeroham, of the family of Paſhur ſon of Malchiah, of all whom mention has been made: he was of the race of the prieſts (Nehem. xi. 12.).

PELASGI. See PELASGIOTIS.

PELASGIA (Pliny; the ancient name of *Leſbos;* ſo called from the Pelaſgi, its firſt inhabitants (Diodorus Siculus). Alſo the ancient name of *Peloponneſus*, from Pelaſgius, a native of the country (Nicolaus Damaſcenus, Ephorus).

PELASGICUM (Pauſanias, Pliny); the north wall of Athens; ſo called from the builders, the Pelaſgi. There was an execration pronounced on any that ſhould build houſes under this wall, becauſe the Pelaſgi, while dwelling there, entered into a conſpiracy againſt the Athenians (Thucydides).

PELASGIOTIS, a third part of Theſſaly, (Strabo); ſo called from a very ancient people, the Pelaſgi, called *Pelaſgiotæ* (Ptolemy); who formerly, together with the Æolians, occupied Theſſaly, and thence that part was called *Pelaſgicum Argos;* beſides many other parts of Greece. Their name *Pelaſgi*, or *Pelargi*, denoting ſtorks, was given them from their wandering roving life (Strabo). The poets extend the appellation to Greeks in general. *Pelaſgus*, the epithet. Some of the inhabitants of Crete were called *Pelaſgi* (Homer); who thus alſo calls the neighbouring people to the Cilicians in Troas. The Pelaſgi were originally of Arcadia, (Heſiod); but Æſchylus makes Argos, near Mycenæ, their country. The Pelaſgiotis was ſituated between Pieria and Macedonia to the north and weſt, Theſſaliotis to the ſouth, and Magneſia to the eaſt, (Strabo, Pliny).

PELATÆ, were free-born citizens, among the Athenians, who by poverty were reduced to the neceſſity of ſerving for wages. During their ſervitude they had no vote in the management of public affairs, as having no eſtate to qualify them; but this reſtriction was removed whenever they had releaſed themſelves from their ſervile ſituation, which they were allowed to do when able to ſupport themſelves. While they continued ſervants, they had alſo a right to change their maſters. We find them ſometimes diſtinguiſhed by the name of *Thetæ*.

PELATIAH, ſon of Hananiah, and father of Iſhi, of the tribe of Simeon. He ſubdued the Amalekites upon the mountain of Seir (1 Chron. iv. 42.). The time of this action is unknown.

PELATIAH, ſon of Benaiah, a prince of the people, who lived in the time of Zedekiah king of Judah, and oppoſed the wholeſome advice given by Jeremiah, to ſubmit to King Nebuchadnezzar. Ezekiel (xi, , 2, 3. 4.) being a captive in Meſopotamia, had a viſion, in which he ſaw five and twenty men at the door of the temple of Jeruſalem, among whom were Jaazaniah the ſon of Azur, and Pelatiah the ſon of Benaiah, who were the moſt remarkable. Then the Lord ſaid to him, "Son of man, theſe are the men that have thoughts of iniquity, and who are forming pernicious deſigns againſt this city, ſaying, Have not the houſes been built a long time? Jeruſalem is the pot, and we are the fleſh. Thus ſaith the Lord: You have made great havock in this city, and have filled its ſtreets with dead bodies. Theſe men are the fleſh, and the city is the pot. But as for you, I will make you come forth from the middle of this city, and I will make you periſh by the hand of your enemies." As he was prophecying in this manner, Pelatiah the ſon of Benaiah died.

PELE, (Stephanus). There were two towns of this name in Theſſaly; the one ſubject to Eurypylus, the other to Achilles; both extinct. *Peleus* the gentilitious name (*id.*).

PELEG, ſon of Eber, was born in the year of the world 1757. The ſcripture ſays his father gave him the name of Peleg, ſignifying diviſion, becauſe in his time the earth began to be divided (Gen. xi. 16. x. 25); whether it was that Noah had begun to diſtribute the earth among his deſcendants, ſome years before the building of Babel; or that Peleg came into the world the ſame year that Babel was begun, and at the diviſion of languages; or that Eber by a ſpirit of prophecy gave his ſon the name of *Peleg* ſome years before the tower of Babel was begun, is not abſolutely certain. That which here perplexes the interpreters is, firſt, that Peleg came into the world not above 100 years after the deluge. But it ſhould ſeem, that the number of men was not then ſufficient for ſuch an undertaking as that of Babel. Secondly, Joktan the brother of Peleg had already thirteen ſons at the time of this diſperſion, which happened after the confuſion of Babel (Gen. x. 26, 27, 28, &c.). Peleg being born in the thirty-fourth year of Eber (Gen. xi. 16.), it is impoſſible his brother Joktan ſhould have ſuch a number of children at the birth of Peleg. It ſeems therefore that he was not born at the time of the diſperſion. To this may be anſwered, that Moſes has there enumerated the names of the thirteen ſons of Joktan (in Gen. x. 26.) by way of anticipation, though they were not born till a good while after the confuſion at Babel; but as they poſſeſſed a very large country, it was convenient to take notice of them, and to name them among the other deſcendants of Noah, who divided the provinces of the eaſt among themſelves. However this may have been, at the age of thirty years Peleg begat Reu; and he died at the age of 239.

PELETHITES. The Pelethites and Cherethites were famous under the reign of King David. They were the moſt valiant men in the army of that prince, and had the guard of his perſon. See Ezekiel xxv. 16. Zephaniah ii. 5. 1 Samuel xxx. 14. 2 Samuel xv. 18. xx. 7. *Patrick's Comm. Pool's Annot.* and *Delany's Hiſt. of the Life of David.*

PELETHRONII, a name or epithet given to the Lapithæ, either becauſe they inhabited the town of Pelethronium at the foot of Mount Pelion in Theſſaly, Pelethronii, Peleus.

ſaly, or becauſe one of their number bore the name of *Pelethronius*. It is to them, we are told, that mankind are indebted for the invention of the bit with which they tamed their horſes with ſo much dexterity.

PELETHRONIUM (Nicander and Scholiaſt); a town of Theſſaly, ſituated in a flowery part of Mount Pelion; and hence the appellation *throna*, ſignifying, "flowers." Lucan ſays the Centaurs were natives of that place; to whom Virgil aſſigns Mount Othrys. Moſt authors, however, aſcribe the breaking of horſes to the Centaurs. Some make the Lapithæ and Centaurs the ſame; others a different people; allowed however to be both of Theſſaly. Their ſtory is greatly involved in fable. See LAPITHÆ.

PELEUS, in *Fabulous Hiſtory*, a king of Theſſaly, ſon of Æacus and Endeis, the daughter of Chiron. He married Thetis one of the Nereids, and was the only mortal man who ever married an immortal. He was concerned in the murder of his brother Phocus, and was therefore obliged to leave his father's dominions. He fled to the court of Eurytus the ſon of Actor, who reigned at Phthia, or according to the opinion of Ovid, the truth of which is queſtioned, to Ceyx king of Trachinia. He was purified of his murder by Eurytus, with the uſual ceremonies, and the king gave him his daughter Antigone in marriage. After this, as Peleus and Eurytus went to the chace of the Calydonian boar, the father-in-law was accidentally killed by an arrow which his ſon-in-law had aimed at the beaſt. This unfortunate accident obliged him to baniſh himſelf from the court of Phthia, and he went to Iolchos, where he was alſo purified of the murder of Eurytus by Acaſtus the king of the country. His reſidence at Iolchos was ſhort: Aſtydamia the wife of Acaſtus fell in love with him; but when ſhe found him inſenſible to her paſſionate declarations, ſhe accuſed him of attempts upon her virtue. The king her huſband partly believed the accuſations of his wife; but not willing to violate the laws of hoſpitality, by putting him inſtantly to death, he ordered his officers to conduct him to Mount Pelion, on pretence of hunting, and there to tie him to a tree and to leave him a prey to the wild beaſts of the place. The orders of Acaſtus were faithfully obeyed: but Jupiter knowing the innocence of his grandſon Peleus, ordered Vulcan to ſet him at liberty. As ſoon as he had been delivered from danger, Peleus aſſembled his friends in order to puniſh the ill treatment which he had received from Acaſtus. He took Iolchos by force, drove the king from his poſſeſſions, and put to death the wicked Aſtydamia. On the death of Antigone, Peleus made love to Thetis, of whoſe ſuperior charms Jupiter himſelf had been enamoured. His pretenſions were rejected; for as he was but a mortal, the goddeſs fled from him with the utmoſt abhorrence, and the more effectually to evade his inquiries, ſhe generally aſſumed the ſhape of a bird, or a tree, or of a tygreſs. Peleus's paſſion was fanned by refuſal: he offered a ſacrifice to the gods; and Proteus informed him, that to obtain Thetis he muſt ſurpriſe her while ſhe was aſleep in her grotto, near the ſhores of Theſſaly. This advice was immediately attended to; and Thetis, unable to eſcape from the graſp of Peleus, at laſt conſented to marry him. Their nuptials were celebrated with the greateſt ſolemnity, all the gods attending and making them each the moſt valuable preſents. The goddeſs of Diſcord was the only one of the deities who was abſent; and ſhe puniſhed this ſeeming neglect by throwing an apple in the midſt of the aſſembly of the gods, with the inſcription of *Detur pulchriori.* The celebrated Achilles was the fruit of this marriage, whoſe education was early entruſted to the Centaur Chiron, and afterwards to Phœnix, the ſon of Amyntor. Achilles, it is well known, went to the Trojan war, at the head of his father's troops; and Peleus gloried in having a ſon who was ſuperior to all the Greeks in valour and intrepidity. His death, however, was the ſource of great grief to Peleus; but Thetis, to comfort her huſband, promiſed him immortality, and ordered him to retire into the grottoes of the iſland of Leuce, where he ſhould ſee and converſe with the manes of his ſon. Peleus had a daughter called *Polydora*, by Antigone.

Pelew Iſlands.

PELEW ISLANDS, a cluſter of ſmall iſlands ſituated between the latitudes of 5° and 7° north, and the longitudes 134° and 136° eaſt. Various conjectures have been formed reſpecting the time of their firſt diſcovery by Europeans. Mr Keate, the editor of the only voyage in which we have any account of their climate, ſoil, and produce, together with the manners of their inhabitants, thinks they were firſt noticed by the Spaniards from the Philippines, and by them named *Palos* from the number of trees growing in them reſembling the maſts of ſhips. This conjecture has been vehemently oppoſed by a critic, who affirms that the whole of Mr Keate's introduction is erroneous, and that the iſlands in queſtion were firſt diſcovered by a French Jeſuit named *Pere Papin*. The Jeſuit, he imagines, was directed to them by one of the inhabitants, who had found his way to the Moluccas, where he was baptized. They are ſaid to have been again noticed by *P. Centova* in 1724, who ſaw at Agdane, the capital of the Merian iſlands, ſome of the inhabitants; and from their account gives a deſcription not very favourable of theſe harmleſs iſlanders. Centova's deſcription is to be found in the 15th volume, and the relation of the diſcovery by P. Papin in the 11th volume, of *Lettres Edifiantes et Curieuſes*, publiſhed at Paris 1781.

The lateſt and moſt authentic account of them, however, is given from the Journals of Captain Wilſon of the Antelope, a packet belonging to the Eaſt India company, which was wrecked upon one of them in Auguſt 1783. This ſhip was fitted out in England by the court of directors in the ſummer 1782, as was then generally underſtood, for a ſecret expedition. Whatever may have been her deſtination, as ſhe was proceeding from Macao in ſqually weather, the man who, on the night of the 10th of Auguſt, had the look-out, ſuddenly called out *Breakers!* But the ſound of the word had ſcarce reached the ears of the officer on deck, before the ſhip ſtruck and ſtuck faſt; and in leſs than an hour bulged and filled with water. Having ſecured the gunpowder, ſmall arms, bread, and ſuch other proviſions as were liable to be ſpoiled by water, Captain Wilſon, after many difficulties, effected a landing. The crew of the Antelope conſiſted of 33 Europeans beſides the captain, and 16 Chineſe: and the only poſſible means by which they could be delivered from an iſland, which at firſt appeared to them uninhabited, was by building a ſhip capable of tranſporting them to the neareſt Eurpean ſettlement in that quarter of the globe. Whilſt they were meditating upon this undertaking, the natives appeared on the ſecond day after their arrival; and their intercourſe with them was facilitated by means which appear as ſingular as they were providential. Captain Wilſon had a ſervant recommended to him at Macao, who ſpoke both the Malay and Engliſh languages perfectly well; and they had not been long at Pelew before they had the good fortune to meet with a Malay, who had been thrown by a tempeſt upon this very ſpot about a year before, and had made himſelf acquainted with the language of the country; ſo that by this extraordinary event each party had an interpreter who could readily explain their wants and deſires, and by that means prevent a number of miſconceptions which might have ariſen from making uſe of ſigns and geſtures only.

The natives are all of a deep copper colour, going perfectly naked. They are of a middling ſtature, very ſtraight, muſcular, and well formed; but their legs, from a little above their ancles to the middle of their thighs, are tatooed ſo very thick, as to appear dyed of a far deeper colour than the reſt of their ſkin. Their hair is of a fine black, long, and rolled up behind, in a ſimple manner, cloſe to the back of their heads, which appeared both neat and becoming; but few of them had beards, it being the general cuſtom to pluck them out by the roots.

They began by ſtroking the bodies and arms of the Engliſh, or rather their waiſtcoats and coat ſleeves, as if they doubted whether the garment and the man were not of the ſame ſubſtance; and as the Malay explained the circumſtances to them, our people were greatly ſurpriſed at the quickneſs with which they ſeemed to comprehend every information he gave them. The next thing they noticed was our people's white hands, and the blue veins of their wriſts; the former of which they ſeemed to conſider as artificial, and the other as the Engliſh manner of tatooing. After being ſatisfied in this particular, they expreſſed a further wiſh to ſee their bodies; and, among other things, were greatly ſurpriſed at finding hair on their breaſts, it being conſidered by them as a great mark of indelicacy, as it is their cuſtom to eradicate it from every part of the body in both ſexes.

They afterwards walked about, teſtifying great curioſity at every thing they ſaw, but at the ſame time expreſſing a fear that they might be thought too intruding. As our people were conducting them to the tents, one of the natives picked up a bullet, which had been caſually dropped on the ground, and immediately expreſſed his ſurpriſe, that a ſubſtance ſo ſmall to the eye ſhould be ſo very ponderous to the touch; and on their entering the tent, a large Newfoundland dog, and a ſpaniel, which had been tied up there to prevent their being loſt, ſet up a moſt violent barking, and the natives a noiſe but little leſs loud, which at firſt it was not eaſy to account for. They ran in and out of the tent, and ſeemed to wiſh that they might be made to bark again. This the Malay ſoon explained to be the effect of their joy and ſurpriſe, as theſe were the firſt large animals they had ever ſeen, there being no quadrupeds of any ſpecies on theſe iſlands, except a very few grey rats in the woods.

After ſome time it was agreed on by Captain Wilſon and his people, that ſome of the crew ſhould be ſent to the king of the place, in order to ſolicit his friendſhip, and intreat his permiſſion to build a veſſel that might carry them back to their own country. This buſineſs was allotted to the captain's brother; and during his abſence, Raa Kook, the king's brother, and ſeveral of the natives, remained with our people. This amiable chief ſeemed to place an entire confidence in thoſe he was among; he endeavoured to accommodate himſelf to their manners; would ſit at table as they did, inſtead of ſquatting on his hams; and inquired particularly into the principles and cauſes of every thing he obſerved about him, lending his perſonal aſſiſtance in all that was going forward, and even deſiring the cook to let him aid him in blowing the fire.

In order to conciliate their affections, Captain Wilſon had preſented Arra Kooker, another of the king's brothers, with a pair of trowſers; but having conceived a greater paſſion for a white ſhirt, one was immediately given to him; which he had no ſooner put on, than he began to dance and jump about with ſo much joy, that every body was diverted by his ſingular geſtures, and the contraſt which the linen formed with his ſkin. This prince was about 40, of a ſhort ſtature, but ſo plump and fat that he was nearly as broad as he was long. He poſſeſſed an abundant ſhare of good humour, and a wonderful turn for mimickry; and had beſides a countenance ſo lively and expreſſive, that though our people at this time were ſtrangers to almoſt all he ſaid, yet his face and geſtures made them accurately comprehend whatever he was deſcribing.

After three or four days, Abba Thulle the king arrived with a great retinue. He was received with every mark of reſpect by the ſhip's company, who were exerciſed before him, and fired three volleys in different poſitions. The ſurpriſe of the natives, their hooting, hallooing, jumping, and chattering, produced a noiſe almoſt equal to the diſcharge of the muſkets; and when one of the men ſhot a bird, which was done to diſplay the effect of their arms, the ſurpriſe it occaſioned was wonderful. Some of the natives ran for it, and carried it to the king, who examined it with great attention, but was unable to comprehend how it could be wounded, not having ſeen any thing paſs out of the gun.

Raa Kook expreſſed great impatience to ſhow the king whatever had impreſſed his own mind; and taking his brother by the hand, led him to a grindſtone which was fixed behind one of the tents. He immediately put it in motion, as he had frequently done before; at the rapidity of which the king was greatly aſtoniſhed, particularly when he was informed that it would ſharpen iron. Captain Wilſon ordered a hatchet to be brought and ground, that they might more readily perceive its operation, when Raa Kook eagerly ſeized the handle, and began turning it, appearing highly delighted to let his brother ſee how well he underſtood it. The whole appeared like ſomething ſupernatural; but the circumſtance which moſt bewildered their ideas was, how the ſparks of fire could come, and how a ſtone ſo well wetted could become ſo ſoon dry.

The king then viſited the different tents, and inquired about every thing he ſaw: all was novelty, and of courſe intereſted his attention. When he got to the tent where the Chineſe men were, who had been brought with them from Macao, Raa Kook, whoſe retentive mind never loſt a ſingle trace of any thing he had been informed of, acquainted the king that there were a people quite different from the Engliſh, and that he had learnt there were many other nations beſides theſe interſperſed through the world, ſome of which fought with guns and others with boarding-pikes, an inſtrument which he held very cheap in compariſon with the former.

When the king heard his brother enumerating about a variety of nations, who all ſpoke differently, and had before him the example of the Chineſe, whoſe language was not the ſame with the Engliſh, he appeared utterly thoughtful and ſerious, as if ſtruck by conceptions which had never before croſſed his mind. He remained a while penſive and bewildered; and this circumſtance impreſſed on every one at the time an idea that there was every reaſon to imagine that there had never been a communication between thoſe people and any other nation: and indeed it is evident, that if Pere Papin did really viſit them in 1710, they had before 1783 loſt the remembrance of every trace of European manners. This indeed is not ſurpriſing, as they had no other record than knots ſimilar to the quipes of Peru at the landing of the Spaniards.

Raa Kook would now ſhow his brother the kitchen, which was in the hollow of a rock, a little above the cove. It was at the time when the cook was preparing dinner; and though the implements were exceedingly ſcanty, an iron pot, a tea kettle, a tin ſauce-pan, with a poker, a pair of tongs, and a frying pan, were here of ſufficient conſequence to excite admiration; nor were the bellows now forgotten by Raa Kook, who taking them up, as he explained their uſe to the king, ſeemed ambitious to let his brother ſee what an adept he was at blowing. The little bald cook, who was always cloſe ſhaven, and never wore any thing on his head, was likewiſe pointed out to the king as an object of merriment and curioſity.

Some time after this the king requeſted five of Captain Wilſon's men to attend him in a war he was going to make againſt the inhabitants of a neighbouring iſland called *Oroolong*, who, as he ſaid, had done him an injury. But before this requeſt was made known, he had long ſtruggled with a delicacy of ſentiment which no one would have expected to find in regions ſo disjoined from the reſt of mankind. This was no other than that it might prove a temporary inconvenience to the unfortunate ſtrangers who had ſought his protection, and might be conſidered by them as an ungenerous proceeding. It was, however, no ſooner made known, than Captain Wilſon inſtantly complied; and every face, which had before been clouded with doubt and apprehenſion, became immediately brightened and gay.

In this enterpriſe little more was done than braving their enemies, ſtripping ſome cocoa-nut trees of their fruit, and carrying off a number of yams and other proviſions; but in another, which was undertaken againſt the iſland of Artingall, they were more ſucceſsful, and ſhowed ſigns of the ſame ſanguinary diſpoſition which ſome demon has infuſed into the whole human race. Nine priſoners of war who had been taken upon this occaſion were cruelly put to death; and notwithſtanding the Engliſh ſtrongly remonſtrated againſt this proceeding, all the arguments they could uſe were of no avail. In juſtification of their conduct, they alleged the neceſſity of doing it for their own ſecurity, declaring that they had formerly only detained them as menial ſervants, but that they always found means to get back to their own country, and return with ſuch a force as frequently made great depredations.

Having given this general account of the character and conduct of theſe hitherto unknown people, we now proceed to lay before our readers what we have learned of their government, cuſtoms, manners, and arts, together with a deſcription of the face of their country. In this the editor of Captain Wilſon's voyage muſt be our guide; and if our narrative do not ſatisfy the man of ſcience, it is to be obſerved, that the Antelope was not a ſhip ſent out purpoſely to explore undiſcovered regions, nor were there people on board properly qualified to eſtimate the manners of a new race of men; they had amongſt them no philoſophers, botaniſts, or draughtſmen, experienced in ſuch ſcientific purſuits as might enable them to examine with judgement every object which preſented itſelf. Diſtreſs threw them upon theſe iſlands; and while they were there, all their thoughts were occupied on the means of liberating themſelves from a ſituation of all others the moſt afflicting to the mind, that of being cut off for ever from the ſociety of the reſt of the world.

It, however, clearly appears, from their uniform teſtimony, that at Pelew the king was conſidered as the firſt perſon in the government.

"He was looked up to as the father of his people; and though diveſted of all external decorations of royalty, had every mark of diſtinction paid to his perſon. His *rupacks* or chiefs approached him with the greateſt reſpect; and his common ſubjects, whenever they paſſed near him, or had occaſion to addreſs him, put their hands behind them, and crouched towards the ground. Upon all occurrences of moment, he convened the rupacks and officers of ſtate; their councils were always held in the open air, where the king firſt ſtated the buſineſs upon which he had aſſembled them, and ſubmitted it to their conſideration. Each rupack delivered his opinion, but without riſing from his ſeat; and when the matter before them was ſettled, the king ſtanding up put an end to the council.

"When any meſſage was brought him, whether in council or elſewhere, if it came by one of the common people, it was delivered at ſome diſtance in a low voice to one of the inferior rupacks, who, bending in an humble manner at the king's ſide, delivered it in the ſame manner with his face turned aſide. His commands appeared to be abſolute, though he acted in no important buſineſs without the advice of his chiefs; and every day in the afternoon, whether he was at Pelew or with the Engliſh, he went to ſit in public for the purpoſe of hearing any requeſts, or of adjuſting any difference or diſpute which might have ariſen among his ſubjects."

But theſe, according to our editor, ſeldom happened: for as their real wants were but few, and they ſtrangers to create artificial ones; every one was chiefly occupied with his own humble purſuits; and as far as the ſhip's crew, who remained among them about three months, could decide, they appeared to conduct themſelves towards each other with the greateſt civility and benevolence: never wrangling or entering into quarrelſome contentions, as is cuſtomary among thoſe who call themſelves a poliſhed and enlightened people. Even when children ſhowed a diſpoſition of this kind, they ſtrongly marked their diſpleaſure, by ſtifling with rebuke their little animoſities.

The character of the king is thus drawn by the editor: "The excellent man who reigned over theſe ſons of nature, ſhowed himſelf in every part of his conduct firm, noble, generous, and benevolent; there was a dignity in all his deportment, a gentleneſs in all his manners, and a warmth and ſenſibility about his heart, that won the love of all who approached him. Nature had beſtowed on him a contemplative mind, which he had improved by thoſe reflections that good ſenſe dictated and obſervation confirmed. The happineſs of his people ſeemed to be always in his thoughts. In order more effectually to ſtimulate them to uſeful labour, he had himſelf learnt all the few arts they poſſeſſed, and was looked on in ſome of them to be the beſt workman in his dominions. Placed as he was by Providence in its obſcurer ſcenes, he lived beloved by his chiefs, and revered by his people; over whom, whilſt he preſerved a dignity which diſtinguiſhed his ſuperior ſtation, he reigned more as the father than the ſovereign. The eyes of his ſubjects beheld their naked prince with as much awe and reſpect as thoſe are viewed with who govern poliſhed nations, and are decorated with all the dazzling parade and ornaments of royalty; nor was the purple robe or the ſplendid diadem neceſſary to point out a character which the maſterly hand of nature had rendered ſo perfect.

Next in power to the king was his brother Raa Kook, who was official general of all his forces. It was his duty to ſummon the rupacks to attend the king for whatever purpoſe they were wanted. He was alſo his preſumptive heir; the ſucceſſion of Pelew not going to the king's children till it had paſſed through his brothers; ſo that after the demiſe of Abba Thulle, the ſovereignty would have deſcended to Raa Kook; on his demiſe to Arra Kooker; and on the death of this laſt it would have reverted to Qui Bill, the king's eldeſt ſon, when Lee Boo, his ſecond ſon, of whom we have much to ſay, would have become the hereditary general.

The office of firſt miniſter is deſcribed as follows: "The king was always attended by a particular chief or rupack, who did not appear to poſſeſs any hereditary office, but only a delegated authority. He was always near the king's perſon, and the chief who was always firſt conſulted; but whether his office was religious or civil, or both, our people could not learn with any certainty. He was not conſidered as a warrior, or ever bore arms, and had only one wife, whereas the other rupacks had two. The Engliſh were never invited to his houſe, or introduced into it, although they were conducted to thoſe of almoſt every other chief."

Of the rupacks it is obſerved, "That they could only be regarded as chiefs or nobles; they were not all of the ſame degree, as was plain by a difference in the *bone* (A) they wore: they generally attended the king, and were always ready at his command to accompany him on any expedition with a number of canoes properly manned, and armed with darts and ſpears, who were to remain with him till they had his permiſſion to return home with their dependents. In this part of their government we may trace an outline of the feudal ſyſtem; but from the few opportunities our people had of inveſtigating points of internal government, it appeared that the titles of *rupacks* were perſonal badges of rank and diſtinction; nor did they apprehend they were hereditary honours, unleſs in the reigning family, who muſt of neceſſity be of this claſs."

As to property, it was underſtood, "That the people poſſeſſed only ſuch as aroſe from their own work and labour, but no abſolute one in the ſoil, of which the king appeared to be general proprietor. A man's houſe, furniture, or canoe, was conſidered as his private property, as was alſo the land allotted him, as long as he occupied and cultivated it; but whenever he removed with his family to another place, the ground he held reverted to the king, who gave it to whom he pleaſed, or to thoſe who ſolicited to cultivate it."

All that part of the iſland which they had an opportunity of ſeeing is ſaid to have been well cultivated. It was covered with trees of various kinds and ſizes, many of which muſt have been very large, as they made canoes of their trunks, ſome of which were capable of carrying twenty-eight or thirty men. Among the timber trees was noticed the ebony, and a tree which when pierced or wounded, yielded a thick white liquor of the conſiſtence of cream. "They had alſo a ſpecies of the manchineel tree, in cutting down of which our people frequently got bliſtered and ſwelled; the inhabitants pointed out the cauſe, ſaying it was owing to their being ſprinkled by the ſap. This they reckoned among the unlucky trees, and adviſed our people againſt the uſe of it."

But the moſt ſingular tree noticed at Pelew, was one in its ſize and manner of branching not unlike our cherry tree, but in its leaves reſembling the myrtle. Its peculiarity was, that it had no bark, but only an outward coat of about the thickneſs of a card, which was darker than the inſide, though equally cloſe in texture. Its colour was nearly that of mahogany, and the wood was ſo extremely hard, that few of the tools which the Engliſh had could work it. They alſo found cabbage-trees, the wild bread-fruit, and another tree whoſe fruit ſomething reſembled an almond. But yams and cocoa-nuts, being their principal articles of ſuſtenance, claimed their chief attention.

The iſland Cooroorаa, of which Pelew is the capital, likewiſe produced plantains, bananas, Seville oranges, and lemons, but neither of them in any conſiderable quantity. None of the iſlands which the Engliſh viſited had any kind of grain. As to birds, they had plenty of common cocks and hens, which, though not domeſticated, kept running about near their houſes and plantations; and what appears extremely ſingular is, that the natives had never made any uſe of them, till our people told them they were excellent eating. Pigeons they accounted a great dainty; but none but thoſe of a certain dignity were permitted to eat of them. The Engliſh left them two geeſe, which were the only remains of their live ſtock.

From

(A) [illegible] mark of [illegible] which Captain Wilſon was inveſted by the king; but [illegible]

Pelew Islands.

From the deſcription of the country it appears to be very mountainous; but ſome of the valleys are repreſented as extenſive and beautiful, affording many delightful proſpects. The ſoil being very rich produces great abundance of graſs, which, as there are no cattle to eat it, grows very high, and was ſcorched and burnt up by the ſun. Our people ſaw no river at Pelew; their ſupplies of freſh water being obtained from ſmall ſtreams and ponds, of which there are a great many.

From this account of the ſcanty produce of theſe iſlands, it is evident that no luxury reigned among their inhabitants, whoſe principal article of food appears to be fiſh; they had no ſalt, nor did they make uſe of ſauce or any ſeaſoning in any thing they ate. Their drink was alſo as ſimple as their diet: it principally conſiſted of the milk of the cocoa nut; but upon particular occaſions they uſed a kind of ſweet drink and ſherbet, which latter had the addition of ſome juice of orange.

The iſlands appeared to be populous, though to what extent could not be aſcertained. Their houſes were raiſed about three feet from the ground, upon ſtones which appeared as if hewn from the quarry. The interior part of them was without any diviſion, the whole forming one great room, which roſe in a ridge like our barns, the outſide being thatched thick and cloſe with bamboos or palm leaves. All their implements, utenſils, weapons of war, and canoes, are much of the ſame kind with thoſe which were found in the South ſea iſlands.

In their marriages they allow a plurality of wives, though not in general more than two. When a woman is pregnant, the utmoſt attention is paid to her; but upon other occaſions no more reſpect is ſhown to one ſex than the other. "One of our people endeavouring to make himſelf agreeable to a lady belonging to one of the rupacks, by what we ſhould call a marked aſſiduity, Arra Kooker, with the greateſt civility, gave him to underſtand that it was not right to do ſo."

They have places particularly appropriated to ſepulture; their graves being made nearly the ſame as they are in our country churchyards. The corpſe is attended only by women, who at the place of interment make a great lamentation. The men, however, aſſemble round the body before it is carried to the grave, on which occaſion they preſerve a ſolemn ſilence; "their minds, from principles of fortitude or philoſophy, being armed to meet the events of mortality with manly ſubmiſſion, diveſted of the external teſtimony of human weakneſs."

On the article of religion our editor obſerves, "That among all the race of men whom navigation has brought to our knowledge, few appear to be without a ſenſe of ſomething like religion, however it may be mixed with idolatry or ſuperſtition. And yet our people, during their continuance with the natives of Pelew, never ſaw any particular ceremonies, or obſerved any thing that had the appearance of public worſhip. But though there was not found on any of the iſlands they viſited any place appropriated to religious rites, it would perhaps be going too far to declare that the people of Pelew had abſolutely no idea of religion. Independent of external teſtimony, there may be ſuch a thing as the religion of the heart, by which the mind may in aweful ſilence be turned to contemplate the God of Nature; and though unbleſſed by thoſe lights which have pointed to the Chriſtian world an unerring path to happineſs and peace, yet they might, by the light of reaſon only, have diſcovered the efficacy of virtue, and the temporal advantages ariſing from moral rectitude.

"Superſtition is a word of great latitude, and vaguely defined: though it hath in enlightened ages been called the offspring of ignorance, yet in no time hath it exiſted without having ſome connection with religion. Now the people of Pelew had beyond all doubt ſome portion of it, as appeared by the wiſh expreſſed by the king when he ſaw the ſhip building, that the Engliſh would take out of it ſome particular wood, which he perceived they had made uſe of, and which he obſerved was deemed an ill omen, or unpropitious.

"They had alſo an idea of an evil ſpirit, that often counteracted human affairs. A very particular inſtance of this was ſeen when Mr Barker, a moſt valuable member in the Engliſh ſociety, fell backwards from the ſide of the veſſel, whilſt he was on the ſtocks: Raa Kook, who happened to be preſent, obſerved that it was owing to the unlucky wood our people had ſuffered to remain in the veſſel, that the evil ſpirit had occaſioned this miſchief to Mr Barker."

They likewiſe appeared to entertain a ſtrong idea of divination, as was evident from the ceremonies they practiſed before they undertook any enterpriſe of moment. A few occurrences, which are mentioned in the courſe of the narrative, would alſo lead us to believe that they could not be altogether unacquainted with the nature of religious worſhip; for when they were preſent at the public prayers of the Engliſh, they expreſſed no ſurpriſe at what was doing, but ſeemed deſirous to join in them, and conſtantly preſerved the moſt profound ſilence. The general even refuſed to receive a meſſage from the king which arrived during divine ſervice. And upon another occaſion, when Captain Wilſon told Lee Boo, that good men would live again above, he replied, with great earneſtneſs, "All ſame Pelew; bad men ſtay in earth; good men go into ſky; become very beautiful;" holding his hand up, and giving a fluttering motion to his fingers. Some later voyagers, however, have affirmed, that theſe people, notwithſtanding their ſuperſtition, have no notion whatever of a Deity; a circumſtance to which it is extremely difficult to give full credit.

The moſt wonderful circumſtances in the hiſtory of this people, except that laſt mentioned, are the acuteneſs of their underſtanding, their hoſpitality, and the implicit confidence which they placed in utter ſtrangers. That their manners were pleaſing, and their ſociety not diſagreeable, is evident from the conduct of Madan Blanchard, one of the ſeamen, who, when the veſſel was built and ready to take her departure with his captain and his companions, was left behind at his own particular requeſt. That they had the fulleſt confidence in Captain Wilſon and his crew, is put beyond a doubt by the behaviour of the king and Raa Kook when their gueſts were to leave them. Raa Kook ſolicited his brother's permiſſion to accompany the Engliſh, but from prudential motives was refuſed. The ſovereign, however, reſolved to entruſt his ſecond ſon Lee Boo to Captain Wilſon's care, that he might improve his mind, and learn ſuch things as at his return would benefit his country.

The inſtructions which he gave the young man, and the fortitude which he ſhowed upon this occaſion, would have done honour to the moſt enlightened mind. Upon delivering him to Captain Wilſon, he uſed theſe expreſſions: "I would wiſh you to inform Lee Boo of all things which he ought to know, and make him an Engliſhman. The ſubject of parting with my ſon I have frequently revolved; I am well aware that the diſtant countries he muſt go through, differing much from his own, may expoſe him to dangers, as well as diſeaſes, that are unknown to us here, in conſequence of which he may die; I have prepared my thoughts to this: I know that death is to all men inevitable; and whether my ſon meets this event at Pelew or elſewhere is immaterial. I am ſatisfied, from what I have obſerved of the humanity of your character, that if he is ſick you will be kind to him; and ſhould that happen, which your utmoſt care cannot prevent, let it not hinder you, or your brother, or your ſon, or any of your countrymen, returning here; I ſhall receive you, or any of your people, in friendſhip, and rejoice to ſee you again." How noble! This is the language of a king, a father, and a philoſopher, who would have been delighted to ſee his ſon with European accompliſhments. But, alas! the ſubſequent hiſtory of this amiable youth muſt force a tear from the eye of every reader whoſe heart is not callous to the genuine feelings of nature and humanity. As ſoon as they arrived at Macao, the houſe into which he firſt entered, and the different articles of furniture, fixed him in ſilent admiration; but what ſtruck his imagination moſt was the upright walls and flat ceilings of the rooms, being utterly unable to comprehend how they could be ſo formed. When he was introduced to the ladies of the family, his deportment was ſo eaſy and polite, that it could be exceeded by nothing but his abundant good nature; and at his departure, his behaviour left on the mind of every one preſent the impreſſion, that, however great the ſurpriſe might be which the ſcenes of a new world had awakened in him, it could hardly be exceeded by that which his own amiable manners and native poliſh would excite in others.

They were now conducted to the houſe of an Engliſh gentleman, who introduced them into a large hall, which was lighted up, with a table in the middle, covered for ſupper, and a ſideboard handſomely decorated. Here a new ſcene burſt at once upon Lee Boo's mind; he was all eye, all admiration. The veſſels of glaſs particularly rivetted his attention; but when he ſurveyed himſelf in a large pier glaſs at the upper end of the hall, he was in raptures with the deception. It was in truth, to him, a ſcene of magic, a fairy tale.

Soon after the people of the veſſel came on ſhore, ſome of them went to purchaſe things they were in want of; in doing which they did not forget Lee Boo, who was a favourite with them all. Among the trinkets they brought him was a ſtring of large glaſs beads, the firſt ſight of which almoſt threw him into an ecſtacy: he hugged them with a tranſport which could not have been exceeded by the intereſted poſſeſſor of a ſtring of oriental pearls. His imagination ſuggeſted to him that he held in his hand all the wealth the world could afford him. He ran with eagerneſs to Captain Wilſon to ſhow him his riches, and begged he would get him a Chineſe veſſel to carry them to the king his father, that he might ſee what the Engliſh had done for him; adding, that if the people faithfully executed their charge, he would at their return preſent them with one or two beads as a reward for their ſervices.

Having no quadrupeds at Pelew, the ſheep, goats, and other cattle, which he met with at Macao, were viewed with wonder; but ſoon after, ſeeing a man paſs the houſe on horſeback, he was ſo much aſtoniſhed, that he wanted every one to go and look at the ſtrange ſight. After the matter, however, was explained to him, he was eaſily perſuaded to get upon horſeback himſelf; and when he was informed what a noble, docile, and uſeful animal it was, he beſought the captain to ſend one to his uncle Raa Kook, as he was ſure it would be of great ſervice to him.

Omitting a number of other particulars of this kind, which excited his curioſity and ſhowed the excellent diſpoſition of his heart, we ſhall follow him to England, the country from which he was never to return. Here he had not been long before he was ſent to an academy to be inſtructed in reading and writing, which he was extremely eager to attain, and moſt aſſiduous in learning. His temper was mild and compaſſionate in the higheſt degree; but it was at all times governed by diſcretion and judgement. If he ſaw the young aſking relief, he would rebuke them with what little Engliſh he had, telling them it was a ſhame to beg when they were able to work; but the intreaties of old age he could never withſtand, ſaying, "Muſt give poor old man, old man no able to work."

He always addreſſed Mr Wilſon by the name of Captain, but never would call Mrs Wilſon by any other name than mother, looking on that as a mark of the greateſt reſpect; and ſuch was the gratitude of his heart for the kindneſs they ſhowed him, that if any of the family were ill, he always appeared unhappy, would creep ſoftly up to the chamber, and ſit ſilent by the bedſide for a long time together without moving, peeping gently from time to time between the curtains, to ſee if they ſlept or lay ſtill.

He was now proceeding with haſty ſtrides in gaining the Engliſh language, writing, and accounts, when he was overtaken by that fatal diſeaſe, the ſmallpox, which the greateſt pains had been taken to guard him againſt; and notwithſtanding the utmoſt care and attention of his phyſician, he fell a victim to this ſcourge of the human race.

Upon this trying occaſion, his ſpirit was above complaining, his thoughts being all engroſſed by the kindneſs of his benefactors and friends. He told his attendant, that his father and mother would grieve very much, for they knew he was ſick. This he repeated ſeveral times, "and begged him to go to Pelew, and tell Abba Thulle that Lee Boo take much drink to make ſmallpox go away, but he die; that the captain and mother very kind; all Engliſh very good men; much ſorry he could not ſpeak to the king the number of fine things the Engliſh had got." Then he reckoned up the preſents which had been given him, deſiring that they might be properly diſtributed among the chiefs, and requeſting that particular care might be taken of two glaſs pedeſtals, which he begged might be preſented to his father.

We have given this ſhort hiſtory of Lee Boo, becauſe it exhibits in a ſtrong light the manners of the natives of the Pelew iſlands, to which we know nothing ſimilar in the hiſtory of man from the ſavage ſtate to that of civilization,

civilization. They appear to have had no communication with any other people, and were yet neither treacherous, cruel, nor cowardly. They are a ſtriking inſtance of the weakneſs of all the philoſophic theories by which mankind are uſually traced from their origin through the ſeveral ſtages of ſavagiſm, barbariſm, and civilization, down to the period of refinement, ending in effeminacy.

Since the publication of Captain Wilſon's voyage we have ſome farther accounts of theſe iſlands, all confirming what we were firſt told of the gentleneſs of the people. Two armed ſhips were, by order of the court of directors, fitted out at Bombay, for the purpoſe of ſurveying the iſlands of Pelew, and furniſhing the natives with domeſtic animals, and ſuch other things as might add to the comforts of life. Among the preſents to the king were ſwords and other European implements of war; of which it is at leaſt poſſible that he and his people might have been equally happy had they remained for ever in total ignorance. The foundation of a fort was likewiſe laid on one of the iſlands, and poſſeſſion of it taken in the name of the Engliſh; we truſt with no remote view of enſlaving the people, or of driving them from their native country. It has been likewiſe announced in a late publication, that Captain M‘Cluer, who commanded the armed ſhips, was ſo delighted with the manners of the king and his ſubjects, that he has reſolved to paſs the remainder of his days on thoſe iſlands at the early age of 34. The following is the ſequel of the adventure here alluded to. The two veſſels called the Panther and Endeavour, under the command of Captain M‘Cluer, were fitted out for a voyage to the Pelew iſlands, to acquaint Abba Thulle the king with the death of his favourite ſon Lee Boo, who went to England with Captain Wilſon in the Antelope in 1783, where he died. On the 24th of Auguſt 1790 Captain M‘Cluer ſailed from Bombay, having on board Meſſrs White and Wedgeborough, who had been ſhipwrecked with Captain Wilſon, and were much eſteemed by the king of thoſe iſlands, at which he arrived in January 1791. Abba Thulle, the king, received them with demonſtrations of joy as Engliſhmen, of whom he had previouſly found reaſon to entertain a very favourable opinion. The preſents which the company ſent to Abba Thulle were landed with all convenient ſpeed. Theſe conſiſted of a conſiderable quantity of live ſtock, ſuch as cows, bulls, ewes, rams, goats, pigs, and poultry, together with arms, ammunition, and packages of hardware, compriſing a number of articles which could not fail to be of ſingular advantage to the natives. The grateful king was aſtoniſhed at the meaning of all this, and being informed that it was a ſmall acknowledgement for his generous treatment of the crew of the Antelope when wrecked on his coaſt, he expreſſed his regret that it was not in his power to have done more.

With the nature and ſituation of theſe iſlands, as well as the amiable and engaging manners of the natives, Captain M‘Cluer was ſo well pleaſed, that he conſidered them as a paradiſe, where he could ſpend with pleaſure the remainder of his days. Soon after theſe tranſactions the Panther ſailed in the month of February from the Pelew iſlands for China, the Endeavour remaining behind till her return, which happened on the 10th of June the ſame year. Having viſited theſe iſlands a third time, after a ſurvey of the coaſt of New Guinea, he ſignified to the officers of the Panther his intention of reſigning the command of the expedition, and remaining on the iſlands. To render his new ſituation as comfortable as poſſible, he requeſted from Mr Wedgeborough about 20 muſkets with bayonets, 12 piſtols, 12 pole-axes, 2 wall-pieces, fuſee and piſtol ammunition, an anvil, bellows, frame-ſaw, ſtanding vice, &c. After a conſultation with the other officers, it was agreed on to ſend him theſe articles, on condition that they ſhould be accounted for by his attorneys, if the the Eaſt India Company ſhould not be ſatisfied with the meaſure. This reſolution was carried into effect in the month of February 1793.

Pelew Iſlands, Pelias.

Scarcely, however had he been 15 months in his new ſettlement till he became impatient to abandon it, and he ſoon after ſet ſail for Macao. He returned to the Pelew iſlands in the year 1795, for the purpoſe of removing his family; and ſailing from thence to Bombay, he touched at Bencoolen, where he met with a frigate bound for Bombay, into which he put a part of his family with ſix Pelew women, ſailing himſelf with the other natives towards Bengal, from which laſt place he ſet ſail ſome time after; but neither he nor any of his crew have been ſince heard of.

PELIAS, in fabulous hiſtory, twin-brother of Neleus, was ſon of Neptune by Tyro, daughter of Salmoneus. His birth was concealed by his mother, who wiſhed her father to be ignorant of her incontinence. He was expoſed in the woods, but his life was preſerved by ſhepherds; and he received the name of *Pelias*, from a ſpot of the colour of *lead* in his face. Some time after Tyro married Cretheus, ſon of Æolus, king of Iolchos, and became mother of three children, of whom Æſon was the eldeſt. Pelias viſited his mother, and was received in her family; and after the death of Cretheus, he unjuſtly ſeized the kingdom, which belonged not to him, but to the children of Tyro by the deceaſed king. To ſtrengthen himſelf in his uſurpation, Pelias conſulted the oracle; and when he was told to beware of one of the deſcendants of Æolus, who ſhould come to his court with one foot ſhod and the other bare, he privately removed the ſon of Æſon, after he had openly declared that he was dead. Theſe precautions proved vain. Jaſon, the ſon of Æſon, who had been educated by Chiron, returned to Iolchos, when come to years of maturity; and having loſt one of his ſhoes in croſſing the river Anaurus or the Evenus, Pelias immediately perceived that this was the perſon whom he had ſo much dreaded. His unpopularity prevented him from acting with violence to a ſtranger, whoſe uncommon dreſs and commanding aſpect had raiſed admiration in the people. But his aſtoniſhment was greatly excited, when he ſaw Jaſon arrive at his palace, with his friends and his relations, and boldly demand the kingdom which he had uſurped. Pelias, conſcious that his complaints were well founded, endeavoured to divert his attention, and told him that he would voluntarily reſign the crown to him, if he went to Colchis to avenge the death of Phryxus, the ſon of Athamas, whom Æeres had cruelly murdered. He further declared, that the expedition would be attended with the greateſt glory, and that nothing but the infirmities of old age had prevented himſelf from vindicating the honour of his country, and the injuries of his family, by puniſhing the aſſaſſin. This ſo warmly ly recommended, was with equal warmth accepted by the young hero, and his intended expedition was made known all over Greece. While Jaſon was abſent in the Argonautic expedition, Pelias murdered Æſon and all his family; but, according to the more received opinion of Ovid, Æſon was ſtill living when the Argonauts returned, and he was reſtored to the flower of youth by the magic of Medea. This change in the vigour and the conſtitution of Æſon aſtoniſhed all the inhabitants of Iolchos; and the daughters of Pelias, who have received the patronymic of Peliades, expreſſed their deſire to ſee their father's infirmities vaniſh by the ſame powerful magic. Medea, who wiſhed to avenge the injuries which her huſband Jaſon had received from Pelias, raiſed the deſires of the Peliades, by cutting an old ram to pieces, and boiling the fleſh in a cauldron, and then turning it into a fine young lamb. After they had ſeen this ſucceſsful experiment, the Peliades cut their father's body to pieces, after they had drawn all the blood from his veins, on the aſſurance that Medea would repleniſh them by her wonderful power. The limbs were immediately put into a cauldron of boiling water; but Medea ſuffered the fleſh to be totally conſumed, and refuſed to give the promiſed aſſiſtance, and the bones of Pelias did not even receive a burial. The Peliades were four in number, Alceſte, Piſidice, Pelopea, and Hippothoe, to whom Hyginus adds Meduſa. Their mother's name was Anaxibia, the daughter of Bias or Philomache, the daughter of Amphion. After this parricide, the Peliades fled to the court of Admetus, where Acaſtus, the ſon-in-law of Pelias, purſued them, and took their protector priſoner. The Peliades died, and were buried in Arcadia.

PELICAN, a genus of birds belonging to the order of anſeres. See ORNITHOLOGY *Index*.

PELICAN, in *Chemiſtry*, is a glaſs alembic conſiſting of one piece, with a tubulated capital, from which two oppoſite and crooked beaks paſs out, and enter again at the bottom of the cucurbit. This veſſel was contrived by the older chemiſts for a continued diſtillation, but has gone into diſuſe.

PELICANUS, a genus of birds belonging to the order of anſeres. See ORNITHOLOGY *Index*.

PELION (Diodorus Siculus, &c.), *Pelios*, *mons* underſtood, (Mela, Virgil, Horace, Seneca), a mountain of Theſſaly near Oſſa, and hanging over the Sinus Pelaſgicus or Pegaſicus; its top covered with pines, the ſides with oaks, (Ovid). Said alſo to abound in wild aſh, (Val. Flaccus). From this mountain was cut the ſpear of Achilles, called *pelias*, which none but himſelf could wield, (Homer). Dicearchus, Ariſtotle's ſcholar, found this mountain 1250 paces higher than any other of Theſſaly, (Pliny). *Pelius*, Cicero; *Peliacus*, (Catullus), the epithet.

PELLA, in *Ancient Geography*, a town ſituated on the confines of Emathia, a diſtrict of Macedonia, (Ptolemy); and therefore Herodotus allots it to Bottiæa, a maritime diſtrict on the Sinus Thermaïcus. It was the royal reſidence, ſituated on an eminence, verging to the ſouth-weſt, encompaſſed with unpaſſable marſhes ſummer and winter: in which, next the town, a citadel like an iſland riſes, placed on a bank or dam, a prodigious work, both ſupporting the wall and ſecuring it from any hurt by means of the circumfluent water. At a diſtance, it ſeems cloſe to the town, but is ſeparated from it by the Ludias, running by the walls, and joined to it by a bridge, (Livy): diſtant from the ſea 120 ſtadia, the Ludias being ſo far navigable, (Strabo). Mela calls the town *Pelle*, though moſt Greek authors write *Pella*. The birth-place of Philip, who enlarged it; and afterwards of Alexander, (Strabo, Mela). Continued to be the royal reſidence down to Perſes, (Livy). Called *Pella Colonia*, (Pliny); *Colonia Julia Auguſta*, (Coin). It afterwards came to decline, with but few and mean inhabitants, (Lucian). It is now called Τα Παλατισια, the *Little Palace*, (Hortenius). *Pellæus*, both the gentilitious name and the epithet, (Lucian, Juvenal, Martial.) —Another PELLA, (Polybius, Pliny); a town of the Decapolis, on the other ſide the Jordan; abounding in water, like its cognominal town in Macedonia; built by the Macedonians, (Strabo); by Seleucus, (Euſebius); anciently called *Butis*, (Stephanus); *Apamea*, (Strabo); ſituated 35 miles to the north-eaſt of Geraſa, (Ptolemy). Thither the Chriſtians, juſt before the ſiege of Jeruſalem by Titus, were divinely admoniſhed to fly, (Euſebius). It was the utmoſt boundary of the Peræa, or Transjordan country, to the north, (Joſephus).

PELLETIER, BERTRAND, a celebrated chemical philoſopher, was born at Bayonne in 1761, and very ſoon diſcovered a ſtrong predilection for the ſciences, to cheriſh which he had every thing in his father's houſe that could be reaſonably deſired, and here he acquired the elements of that art for which he was afterwards ſo famous. His ſubſequent progreſs he made under Darcet, who admitted him among the pupils attached to the chemical laboratory of France. Five years intenſe application under ſuch a maſter, gave him a ſtock of knowledge very uncommon at his years. As a convincing proof of this, he publiſhed, when only 21, a number of valuable obſervations on arſenic acid, proving, contrary to the opinion of Macquer, that ſulphuric acid diſtilled from the arſeniate of potaſh, diſengages the acid of arſenic.

Encouraged by the ſucceſs which attended his firſt labours of a chemical nature, he communicated his remarks on the cryſtallization of ſulphur, cinnabar, and the deliqueſcent ſalts; the examination of zeolites, particularly the falſe zeolite of Freyburg, which he diſcovered to be merely an ore of zinc. He alſo made obſervations on the oxygenated muriatic acid, in reference to the abſorption of oxygen; on the formation of ethers, chiefly the muriatic and the acetous; and a number of memoirs on the operation of phoſphorus made in the large way; its converſion into phoſphoric acid, and its combination with ſulphur and moſt metallic ſubſtances.

It was by his operations on phoſphorus that he burnt himſelf ſo ſeverely as nearly to endanger his life. Immediately on his recovery he began the analyſis of different varieties of plumbago from France, England, Germany, Spain, and America, and gave both novelty and intereſt to his work, even after the labours of Scheele on the ſame ſubject had made their appearance. The analyſis of the carbonate of barytes led him to make experiments on animals, from which he diſcovered that this earth is a real poiſon, in whatever way adminiſtered. Strontites was alſo analyſed by this celebrated chemiſt, which was found to contain a new earth.

Pelletier diſcovered a proceſs for preparing verditer in the large way, equal, it is ſaid, in beauty to that which is manufactured in England. He was alſo among the firſt who ſhewed the poſſibility of refining bell metal, and ſeparating the tin. His firſt experiments were performed at Paris, after which he went to the foundery at Romilly, to prove their accuracy in the large way. He was ſoon after this admitted a member of the Academy of Sciences at Paris, and afterwards accompanied Borda and General Daboville to La Fere, to aſſiſt in experiments on a new ſpecies of gunpowder. Being obliged to paſs great part of the day in the open air during a cold and moiſt ſeaſon, in order to render his experiments more deciſive, his health, which was naturally delicate, was very much impaired. He partly recovered it, but again fell a victim to his thirſt after knowledge, for he was at one time nearly deſtroyed by inſpiring the oxygenated muriatic acid gas, which occaſioned a convulſive aſthma, which at times appeared to abate, but was found to be incurable. The aſſiſtance of art was inſufficient to ſave him, and he died at Paris on the 21ſt of July 1797, of a pulmonary conſumption, in the flower of his age, being only 36.

PELLETS, in *Heraldry*, thoſe roundles that are black; called alſo *ogreſſes* and *gunſtones*, and by the French *torteaux de ſable*.

PELLICLE, among phyſicians, denotes a thin film or fragment of a membrane. Among chemiſts it ſignifies a thin ſurface of cryſtals uniformly ſpread over a ſaline liquor evaporated to a certain degree.

PELLISON, or PELLISON FONTANIER, PAUL, one of the fineſt geniuſes of the 17th century, was the ſon of James Pelliſon counſellor at Caſtres. He was born at Beziers in 1624, and educated in the Proteſtant religion. He ſtudied with ſucceſs the Latin, Greek, French, Spaniſh, and Italian tongues, and applied himſelf to the reading the beſt authors in theſe languages; after which he ſtudied the law at Caſtres with reputation. In 1652 he purchaſed the poſt of ſecretary to the king, and five years after became firſt deputy to M. Fouquet. He ſuffered by the diſgrace of that miniſter; and in 1661 was confined in the Baſtile, from whence he was not diſcharged till four years after. During his confinement he applied himſelf to the ſtudy of controverſy; and in 1670 abjured the Proteſtant religion. Louis XIV. beſtowed upon him an annual penſion of 2000 crowns; and he likewiſe enjoyed ſeveral poſts. In 1676 he had the abbey of Giment, and ſome years after the priory of St Orens at Auch. He died in 1693. His principal works are, 1. The Hiſtory of the French Academy. 2. Reflections on religious Diſputes, &c. in 4 vols. 12mo. 3. The Hiſtory of Louis XIV. 4. Hiſtorical Letters and Miſcellanies, in 3 vols. 12mo.

PELOPIA, a feſtival obſerved by the Eleans in honour of Pelops. A ram was ſacrificed on the occaſion, which both prieſts and people were prohibited from partaking of, on pain of excommunication from Jupiter's temple: the neck only was allotted to the officer who provided wood for the ſacrifice. This officer was called Ξυλευς; and white poplar was the only wood made uſe of at this ſolemnity.

PELOPONNESUS, (Dionyſius), a large peninſula to the ſouth of the reſt of Greece; called, as it were *Pelopis neſus*, or *inſula*, though properly not an iſland, but a peninſula; yet wanting but little to be one, viz. the iſthmus of Corinth, ending in a point like the leaf of the platane or plane tree. Anciently called *Apia* and *Pelaſgia*; a peninſula ſecond to no other country for nobleneſs; ſituated between two ſeas, the Egean and Ionian, and reſembling a platane-leaf, on account of its angular receſſes or bays, (Pliny, Strabo, Mela). Strabo adds from Homer, that one of its ancient names was *Argos*, with the epithet *Achaicum*, to diſtinguiſh it from Theſſaly, called *Pelaſgicum*. Divided into ſix parts; namely, Argolis, Laconica, Meſſenia, Elis, Achaia, and Arcadia, (Mela). Now called the *Morea*.

PELOPS, in fabulous hiſtory, the ſon of Tantalus king of Phrygia, went into Elis, where he married Hippodamia the daughter of Oenomaus king of that country; and became ſo powerful, that all the territory which lies beyond the iſthmus, and compoſes a conſiderable part of Greece, was called *Peloponneſus*, that is, the *iſland of Pelops*, from his name and the word Νεσος.

PELTA, a ſmall, light, manageable buckler, uſed by the ancients. It was worn by the Amazons. The pelta is ſaid by ſome to have reſembled an ivy leaf in form; by others it is compared to the leaf of an Indian fig-tree; and by Serbius to the moon in her firſt quarter.

PELTARIA, a genus of plants belonging to the tetradynamia claſs, and in the natural method ranking under the 39th order, *Siliquoſæ*. See BOTANY *Index*.

PELUSIUM, in *Ancient Geography*, a ſtrong city of Egypt, without the Delta, diſtant 20 ſtadia from the ſea; ſituated amidſt marſhes; and hence its name and its ſtrength. Called the *key* or *inlet of Egypt* (Diodorus, Hirtius); which being taken, the reſt of Egypt lay quite open and expoſed to an enemy. Called *Sin* (Ezekiel). *Peluſiacus* the epithet (Virgil, Diodorus). From its ruins aroſe Damietta. E. Long. 32°, N. Lat. 31°.

Letters on Egypt.

Mr Savary gives us the following account of this place: "The period of its foundation, as well as that of the other ancient cities of Egypt, is loſt in the obſcurity of time. It flouriſhed long before Herodotus. As it commanded the entrance of the country on the ſide of Aſia, the Pharaohs rendered it a conſiderable fortreſs; one of them raiſed a rampart of 30 leagues in length from the walls of this town to Heliopolis. But we find from the hiſtory of nations that the long wall of China, thoſe which the weakneſs of the Greek emperors led them to build round Conſtantinople, and many others, built at an immenſe expence, were but feeble barriers againſt a warlike people: theſe examples have taught us, that a ſtate, to be in ſecurity againſt a foreign yoke, muſt form warriors within itſelf, and that men muſt be oppoſed to men. This rampart which covered Peluſium, did not ſtop Cambyſes, who attacked it with a formidable army. The feeble character of the ſon of Amaſis, unable to prevent the deſertion of 200,000 Egyptians, who went to found a colony beyond the cataracts, had not force ſufficient to oppoſe that torrent which broke in upon his country. Cambyſes, after a bloody battle, wherein he cut his enemies to pieces, entered Peluſium in triumph. That memorable day, which ſaw the deſertion of one part of the Egyptian militia and the ruin of the other, is the true epoch of the ſubjugation of that rich country. Since that period, it has paſſed under the yoke of the Perſians, the Macedonians, the Romans, the Greeks, the Arabs, and the Turks. A

Pelufium ‖ Pembroke.

continued ſlavery of more than 2000 years ſeems to ſecure them an eternal bondage.

"Herodotus, who viſited Peluſium ſome years after the conqueſt of Cambyſes, relates an anecdote which I cannot omit. 'I ſurveyed (ſays he) the plain where the two armies had fought. It was covered with human bones collected in heaps. Thoſe of the Perſians were on one ſide, thoſe of the Egyptians on the other, the inhabitants of the country having taken care to ſeparate them after the battle. They made me take notice of a fact which would have appeared very aſtoniſhing to me without their explanation of it. The ſkulls of the Perſians, which were ſlight and fragile, broke on being lightly ſtruck with a ſtone; thoſe of the Egyptians, thicker and more compact, reſiſted the blows of flint. This difference of ſolidity they attributed to the cuſtom the Perſians have of covering their heads from their infancy with the tiara, and to the Egyptian cuſtom of leaving the heads of their children bare and ſhaved, expoſed to the heat of the ſun.' This explanation appeared ſatisfactory to me.' Mr Savary aſſures us that the ſame cuſtoms ſtill ſubſiſt in Egypt, of which he frequently had ocular demonſtration.

"Peluſium (continues he), after paſſing under the dominion of Perſia, was taken by Alexander. The brave Antony, general of cavalry under Gabinius, took it from his ſucceſſors, and Rome reſtored it to Ptolemy Auletes. Pompey, whoſe credit had eſtabliſhed this young prince on the throne of Egypt, after the fatal battle of Pharſalia took refuge at Peluſium. He landed at the entrance of the harbour; and on quitting his wife Cornelia and his ſon, he repeated the two following verſes of Sophocles, 'The free man who ſeeks an aſylum at the court of a king will meet with ſlavery and chains.' He there found death. Scarcely had he landed on the ſhore, when Theodore the rhetorician, of the iſle of Chio, Septimius the courtier, and Achillas the eunuch, who commanded his troops, wiſhing for a victim to preſent to his conqueror, ſtabbed him with their ſwords. At the ſight of the aſſaſſins Pompey covered his face with his mantle, and died like a Roman. They cut off his head, and embalmed it, to offer it to Cæſar, and left his body naked on the ſhore. It was thus that this great man, whoſe warlike talents had procured the liberty of the ſeas for the Romans, and added whole kingdoms to their extended empire, was baſely ſlain in ſetting foot on the territory of a king who owed to him his crown. Philip his freedman, collecting together, under favour of the night, the wreck of a boat, and ſtripping off his own cloak to cover the ſad remains of his maſter, burnt them according to the cuſtom. An old ſoldier, who had ſerved under Pompey's colours, came to mingle his tears with thoſe of Philip, and to aſſiſt him in performing the laſt offices to the manes of his general.—Peluſium was often taken and pillaged during the wars of the Romans, the Greeks, and the Arabs. But in ſpite of ſo many diſaſters, ſhe preſerved to the time of the Cruſades her riches and her commerce. The Chriſtian princes having taken it by ſtorm, ſacked it. It never again roſe from its ruins; and the inhabitants went to Damietta." See DAMIETTA.

PELVIS, in *Anatomy*. See ANATOMY *Index*.

PEMBROKE, MARY, COUNTESS OF. See HERBERT.

PEMBROKE, in Pembrokeſhire, in England, is the principal town in the county. It is ſituated upon a creek of Milford-Haven, and in the moſt pleaſant part of Wales, being about 256 miles diſtant from London. It is the county-town, and has two handſome bridges over two ſmall rivers which run into a creek, forming the weſt ſide of a promontory. It is well inhabited, has ſeveral good houſes, and but one church. There is alſo a cuſtomhouſe in it. There are ſeveral merchants in it, who, favoured by its ſituation, employ near 200 ſail on their own account; ſo that, next to Caermarthen, it is the largeſt and richeſt town in South Wales. It has one long ſtraight ſtreet, upon a narrow part of a rock; and the two rivers ſeem to be two arms of Milford-Haven, which ebbs and flows cloſe up to the town. It was in former times fortified with walls, and a magnificent caſtle ſeated on a rock at the weſt end of the town. In this rock, under the chapel, is a natural cavern called *Wogan*, remarked for having a very fine echo: this is ſuppoſed to have been a ſtore-room for the garriſon, as there is a ſtaircaſe leading into it from the caſtle: it has alſo a wide mouth towards the river. This ſtructure being burnt a few years after it was erected, it was rebuilt. It is remarkable for being the birth-place of Henry VII. and for the brave defence made by the garriſon for Charles I.

Pembroke-ſhire.

PEMBROKESHIRE, a county of Wales, bounded on all ſides by the Iriſh ſea, except on the eaſt, where it joins to Caermarthenſhire, and on the north-eaſt to Cardiganſhire. It lies the neareſt to Ireland of any county in Wales; and extends in length from north to ſouth 35 miles, and from eaſt to weſt 29, and is about 140 in circumference. It is divided into ſeven hundreds; contains about 420,000 acres, one city, eight market-towns, two foreſts, 145 pariſhes, about 11,800 houſes, and 56,000 inhabitants. It lies in the province of Canterbury, and dioceſe of St David's. It ſends three members to parliament, viz. one for the ſhire, one for Haverfordweſt, and one for the town of Pembroke.

The air of Pembrokeſhire, conſidering its ſituation, is good; but it is in general better the farther from the ſea. As there are but few mountains, the ſoil is generally fruitful, eſpecially on the ſea-coaſts; nor are its mountains altogether unprofitable, but produce paſture ſufficient to maintain great numbers of ſheep and goats. Its other commodities are corn, cattle, pit-coal, marl, fiſh, and fowl. Among theſe laſt are falcons, called here *peregrines*. Amongſt the birds common here are migratory ſea-birds, that breed in the iſle of Ramſey, and the adjoining rocks called *The Biſhop and his Clerks*. About the beginning of April ſuch flocks of ſea-birds, of ſeveral kinds, reſort to theſe rocks, as appear incredible to thoſe who have not ſeen them.

The inhabitants of this county make a very pleaſant durable fire of culm, which is the duſt of coal made up into balls with a third part of mud. The county is well watered by the rivers Clethy, Dougledy, Cledhew, and Teive; which laſt parts it from Cardiganſhire. There is a diviſion of the county ſtyled *Rhos* in the Welch, by which is meant a large green plain. This is inhabited by the deſcendants of the Flemings, placed there by Henry I. to curb the Welch, who were never able to expel them, though they often attempted it. On the coaſts of this county, as well as on thoſe of Glamorganſhire and the Severn ſea, is found a kind of alga or laver, which is gathered in ſpring; and of which the inhabitants make a ſort of food, called in Welch *lhavan*, and in Engliſh *black butter*. Having waſhed it clean, they lay it to ſweat between two flat ſtones, then ſhred it ſmall, and knead it well, like dough for bread, and then make it up into great balls or rolls, which is by ſome eaten raw, and by others fryed with oatmeal and butter. It is accounted excellent againſt many diſtempers.

PEN, a town of Somerſetſhire, in England, on the north-eaſt ſide of Wincaunton, where Kenwald a Weſt Saxon king ſo totally defeated the Britons, that they were never after able to make head againſt the Saxons; and where, many ages after this, Edmund Ironſide gained a memorable victory over the Danes, who had before, i. e. in 1001, defeated the Saxons in that ſame place.

Pen, a little inſtrument, uſually formed of a quill, ſerving to write withal.

Pens are alſo ſometimes made of ſilver, braſs, or iron.

Dutch PENS, are made of quills that have paſſed through hot aſhes, to take off the groſſer fat and moiſture, and render them more tranſparent.

Fountain PEN, is a pen of ſilver, braſs, &c. contrived to contain a conſiderable quantity of ink, and let it flow out by gentle degrees, ſo as to ſupply the writer a long time without being under the neceſſity of taking freſh ink.

late
CVII.
g. 1.

The fountain pen is compoſed of ſeveral pieces. The middle piece, fig. 1. carries the pen, which is ſcrewed into the inſide of a little pipe, which again is ſoldered to another pipe of the ſame bigneſs as the lid, fig. 2.; in which lid is ſoldered a male ſcrew, for ſcrewing on the cover, as alſo for ſtopping a little hole at the place and hindering the ink from paſſing through it. At the other end of the piece, fig. 1. is a little pipe, on the outſide of which the top-cover, fig. 3. may be ſcrewed. In the cover there goes a port-crayon, which is to be ſcrewed into the laſt-mentioned pipe, in order to ſtop the end of the pipe, into which the ink is to be poured by a funnel. To uſe the pen, the cover fig. 2. muſt be taken off, and the pen a little ſhaken, to make the ink run more freely.

There are, it is well known, ſome inſtruments uſed by practical mathematicians, which are called *pens*, and which are diſtinguiſhed according to the uſe to which they are principally applied; as for example, the drawing pen, &c. an inſtrument too common to require a particular deſcription in this place. But it may be proper to take ſome notice of the geometric pen, as it is not ſo well known, nor the principles on which it depends ſo obvious.

The *geometric PEN* is an inſtrument in which, by a circular motion, a right line, a circle, an ellipſe, and other mathematical figures, may be deſcribed. It was firſt invented and explained by John Baptiſt Suardi, in a work intitled *Nuovo Inſtromenti per la Deſcrizzione di diverſe Curve Antichi e Moderne*, &c. Several writers had obſerved the curves ariſing from the compound motion of two circles, one moving round the other; but Suardi firſt realized the principle, and firſt reduced it to practice. It has been lately introduced with ſucceſs into the ſteam-engine by Watt and Bolton. The number of curves this inſtrument can deſcribe is truly amazing; the author enumerates not leſs than 1273, which (he ſays) can be deſcribed by it in the ſimple form. We ſhall give a ſhort deſcription of it from Adam's Geometrical and Graphical Eſſays.

Plate CCCCVII. Fig. 1.

Fig. 1. repreſents the geometric pen; A. B, C, the ſtand by which it is ſupported; the legs A, B, C, are contrived to fold one within the other for the convenience of packing. A ſtrong axis D is fixed to the top of the frame; to the lower part of this axis any of the wheels (as *i*) may be adapted; when ſcrewed to it they are immoveable. EG is an arm contrived to turn round upon the main axis D; two ſliding boxes are fitted to this arm; to theſe boxes any of the wheels belonging to the geometric pen may be fixed, and then ſlid ſo that the wheels may take into each other and the immoveable wheel *i*; it is evident, that by making the arm EG revolve round the axis D, theſe wheels will be made to revolve alſo, and that the number of their revolutions will depend on the proportion between the teeth. F*g* is an arm carrying the pencil; this arm ſlides backwards and forwards in the box *cd*, in order that the diſtance of the pencil from the centre of the wheel *h* may be eaſily varied; the box *cd* is fitted to the axis of the wheel *h*, and turns round with it, carrying the arm *fg* along with it: it is evident, therefore, that the revolutions will be fewer or greater in proportion to the difference between the numbers of the teeth in the wheels *h* and *i*; this bar and ſocket are eaſily removed for changing the wheels. When two wheels only are uſed, the bar *fg* moves in the ſame direction with the bar EG; but if another wheel is introduced between them, they move in contrary directions.

" The number of teeth in the wheels, and conſequently the relative velocity of the epicycle or arm *fg*, may be varied *in infinitum*. The numbers we have uſed are 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96.

" The conſtruction and application of this inſtrument is ſo evident from the figure, that nothing more need be pointed out than the combinations by which various figures may be produced. We ſhall take two as examples:

" The radius of EG (fig. 2.) muſt be to that of *fg* as 10 to 5 nearly; their velocities, or the number of teeth in the wheels, to be equal; the motion to be in the ſame direction. Fig. 2.

" If the length of *fg* be varied, the looped figure delineated at fig. 3. will be produced. A circle may be deſcribed by equal wheels, and any radius but the bars muſt move in contrary directions. Fig. 3.

" *To deſcribe by this circular motion a ſtraight line and an ellipſis:* For a ſtraight line, equal radii, the velocity as 1 to 2, the motion in a contrary direction; the ſame data will give a variety of ellipſes, only the radii muſt be unequal; the ellipſes may be deſcribed in any direction." See fig. 4. Fig. 4.

Pen, or *Penſtock*. See **Penstock**.

Sea-PEN. See **Pennatula**, **Helminthology** *Index*.

PENANCE, a puniſhment, either voluntary or impoſed by authority, for the faults a perſon has committed. Penance is one of the ſeven ſacraments of the Romiſh church. Beſides faſting, alms, abſtinence, and the like, which are the general conditions of penance, there are others of a more particular kind; as the repeating a certain number of ave marys, pater noſters, and credos, wearing a hair ſhirt, and giving one's ſelf a certain number of ſtripes. In Italy and Spain it is uſual to ſee Chriſtians almoſt naked, loaded with chains and a croſs, and laſhing themſelves at every ſtep.

PENATES, in Roman antiquity, a kind of tutelar deities, either of countries or particular houſes; in which laſt ſenſe they differed in nothing from the lares. See LARES.

The penates were properly the tutelar gods of the Trojans, and were only adopted by the Romans, who gave them the title of *penates*.

PENCIL, an inſtrument uſed by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the largeſt ſorts are made of boars briſtles, the thick ends of which are bound to a ſtick, bigger or leſs according to the uſes they are deſigned for; theſe, when large, are called *bruſhes*. The finer ſorts of pencils are made of camels, badgers, and ſquirrels hair, and of the down of ſwans; theſe are tied at the upper end with a piece of ſtrong thread, and encloſed in the barrel of a quill.

All good pencils, on being drawn between the lips, come to a fine point.

PENCIL, is alſo an inſtrument uſed in drawing, writing, &c. made of long pieces of black lead or red chalk, placed in a groove cut in a ſlip of cedar; on which other pieces of cedar being glued, the whole is planed round, and one of the ends being cut to a point, it is fit for uſe.

Black lead in fine powder, ſtirred into melted ſulphur, unites with it ſo uniformly, and in ſuch quantity, in virtue perhaps of its abounding with ſulphur, that though the compound remains fluid enough to be poured into moulds, it looks nearly like the coarſer ſorts of black lead itſelf. Probably the way which Prince Rupert is ſaid to have had, mentioned in the third volume of Dr Birch's Hiſtory of the Royal Society, of making black lead run like a metal in a mould, ſo as to ſerve for black lead again, conſiſted in mixing with it ſulphur or ſulphureous bodies.

On this principle the German black lead pencils are ſaid to be made; and many of thoſe which are hawked about by certain perſons among us are prepared in the ſame manner: their melting or ſoftening, when held to a candle, or applied to a red hot iron, and yielding a bluiſh flame, with a ſtrong ſmell like that of burning brimſtone, betrays their compoſition; for black lead itſelf yields no ſmell or fume, and ſuffers no apparent alteration in that heat. Pencils made with ſuch additions are of a very bad kind; they are hard, brittle, and do not caſt or make a mark freely either on paper or wood, rather cutting or ſcratching them than leaving a coloured ſtroke.

The true Engliſh pencils (which Vogel in his mineral ſyſtem, and ſome other foreign writers, imagine to be prepared alſo by melting the black lead with ſome additional ſubſtances, and caſting it into a mould) are formed of black lead alone ſawed into ſlips, which are fitted into a groove made in a piece of wood, and another ſlip of wood glued over them: the ſofteſt wood, as cedar, is made choice of, that the pencil may be the eaſier cut; and a part at one end, too ſhort to be conveniently uſed after the reſt has been worn and cut away, is left unfilled with the black lead, that there may be no waſte of ſo valuable a commodity. Theſe pencils are greatly preferable to the others, though ſeldom ſo perfect as could be wiſhed, being accompanied with ſome degree of the ſame inconveniences, and being very unequal in their quality, on account of different ſorts of the mineral being fraudulently joined together in one pencil, the fore part being commonly pretty good, and the reſt of an inferior kind. Some, to avoid theſe imperfections, take the finer pieces of black lead itſelf, which they ſaw into ſlips, and fix for uſe in port crayons: this is doubtleſs the ſureſt way of obtaining black lead crayons, whoſe goodneſs can be depended on.

PENDANT, an ornament hanging at the ear, frequently compoſed of diamonds, pearls, and other jewels.

PENDANTS, in *Heraldry*, parts hanging down from the label, to the number of three, four, five, or ſix at moſt, reſembling the drops in the Doric freeze. When they are more than three, they muſt be ſpecified in blazoning.

PENDANTS of a Ship, are thoſe ſtreamers, or long colours, which are ſplit and divided into two parts, ending in points, and hung at the head of maſts, or at the yard-arm ends.

PENDENE-Vow, in Cornwall, in England, on the north coaſt, by Morvath. There is here an unfathomable cave under the earth, into which the ſea flows at high water. The cliffs between this and St Ives ſhine as if they had ſtore of copper, of which indeed there is abundance within land.

PENDENNIS, in Cornwall, at the mouth of Falmouth haven, is a peninſula of a mile and a half in compaſs. On this Henry VIII. erected a caſtle, oppoſite to that of St Maw's, which he likewiſe built. It was fortified by Queen Elizabeth, and ſerved then for the governor's houſe. It is one of the largeſt caſtles in Britain, and is built on a high rock. It is ſtronger by land than St Maw's, being regularly fortified, and having good outworks.

PENDULOUS, a term applied to any thing that bends or hangs downwards.

PENDULUM, a vibrating body ſuſpended from a fixed point. For the hiſtory of this invention, ſee the article CLOCK.

The theory of the pendulum depends on that of the inclined plane. Hence, in order to underſtand the nature of the pendulum, it will be neceſſary to premiſe ſome of the properties of this plane; referring, however to *Inclined* PLANE, and to the article MECHANICS, for the demonſtration.

Plate CCCVIII. Fig. 1.

I. Let AC (fig. 1.) be an inclined plane, AB its perpendicular height, and D any heavy body: then the force which impels the body D to deſcend along the inclined plane AC, is to the abſolute force of gravity as the height of the plane AB is to its length AC; and the motion of the body will be uniformly accelerated.

II. The velocity acquired in any given time by a body deſcending on an inclined plane AC, is to the velocity acquired in the ſame time by a body falling freely and perpendicularly, as the height of the plane AB to its length AC. The final velocities will be the ſame; the ſpaces deſcribed will be in the ſame ratio; and the times of deſcription are as the ſpaces deſcribed.

III. If a body deſcend along ſeveral contiguous planes, AB, BC, CD, (fig. 2.) the final velocity, namely, that at the point D, will be equal to the final velocity in deſcending through the perpendicular AE, the perpendicular heights being equal. Hence, if theſe planes be ſuppoſed indefinitely ſhort and numerous, they may be conceived to form a curve, and therefore the final velocity acquired by a body in deſcending through any curve AF, will be equal to the final velocity acquired in deſcending through the planes AB, BC, CD, or to that in deſcending through AE, the perpendicular heights being equal.

IV. If from the upper or lower extremity of the vertical diameter of a circle a cord be drawn, the time of deſcent along this cord will be equal to the time of deſcent through the vertical diameter; and therefore the times of deſcent through all cords in the ſame circle, drawn from the extremity of the vertical diameter, will be equal.

V. The times of deſcent of two bodies through two planes equally elevated will be in the ſubduplicate ratio of the lengths of the planes. If, inſtead of one plane, each be compoſed of ſeveral contiguous planes ſimilarly placed, the times of deſcent along theſe planes will be in the ſame ratio. Hence, alſo, the times of deſcribing ſimilar arches of circles ſimilarly placed will be in the ſubduplicate ratio of the lengths of the arches.

VI. The ſame things hold good with regard to bodies projected upwards, whether they aſcend upon inclined planes or along the arches of circles.

The point or axis of ſuſpenſion of a pendulum is that point about which it performs its vibrations, or from which it is ſuſpended.

The centre of oſcillation is a point in which, if all the matter in a pendulum were collected, any force applied at this centre would generate the ſame angular velocity in a given time as the ſame force when applied at the centre of gravity.

The length of a pendulum is equal to the diſtance between the axis of ſuſpenſion and centre of oſcillation.

ig. 3. Let PN (fig. 3.) repreſent a pendulum ſuſpended from the point P; if the lower part N of the pendulum be raiſed to A, and let fall, it will by its own gravity deſcend through the circular arch AN, and will have acquired the ſame velocity at the point N that a body would acquire in falling perpendicularly from C to F, and will endeavour to go off with that velocity in the tangent ND; but being prevented by the rod or cord, will move through the arch NB to B, where, loſing all its velocity, it will by its gravity deſcend through the arch BN, and, having acquired the ſame velocity as before, will aſcend to A. In this manner it will continue its motion forward and backward along the arch ANB, which is called an *oſcillatory* or *vibratory* motion; and each ſwing is called a *vibration*.

Prop. I. If a pendulum vibrates in very ſmall circular arches, the times of vibration may be conſidered as equal, whatever be the proportion of the arches.

ig. 4. Let PN (fig. 4.) be a pendulum; the time of deſcribing the arch AB will be equal to the time of deſcribing CD; theſe arches being ſuppoſed very ſmall.

Join AN, CN; then ſince the times of deſcent along all cords in the ſame circles, drawn from one extremity of the vertical diameter, are equal; therefore the cords AN, CN, and conſequently their doubles, will be deſcribed in the ſame time; but the arches AN, CN being themſelves ſuppoſed very ſmall, will therefore be nearly equal to their cords: hence the times of vibrations in theſe arches will be nearly equal.

Prop. II. Pendulums which are of the ſame length vibrate in the ſame time, whatever be the proportion of their weights.

This follows from the property of gravity, which is always proportional to the quantity of matter, or to its inertia. When the vibrations of pendulums are compared, it is always underſtood that the pendulums deſcribe either ſimilar finite arcs, or arcs of evaneſcent magnitude, unleſs the contrary is mentioned.

Prop. III. If a pendulum vibrates in the ſmall arc of a circle, the time of one vibration is to the time of a body's falling perpendicularly through half the length of the pendulum, as the circumference of a circle is to its diameter.

Let PE (fig. 5.) be the pendulum which deſcribes the arch ANC in the time of one vibration; let PN be perpendicular to the horizon, and draw the cords AC, AN; take the arc E*e* infinitely ſmall, and draw EFG, *efg* perpendicular to PN, or parallel to AC; deſcribe the ſemicircle BGN, and draw *er*, *gs* perpendicular to EG: now let $t=$ time of deſcending through the diameter 2PN, or through the cord AN: Then the velocities gained by falling through 2PN, and by the pendulum's deſcending through the arch AE, will be as $\sqrt{2PN}$ and $\sqrt{BF}$; and the ſpace deſcribed in the time t, after the fall through 2PN, is 4PN. But the times are as the ſpaces divided by the velocities. Fig. 5.

Therefore $\frac{4PN}{\sqrt{2PN}}$ or $2\sqrt{2PN} : t :: \frac{Ee}{\sqrt{BF}}$: time of deſcribing $Ee=\frac{t\times Ee}{2\sqrt{2PN\times BF}}$. But in the ſimilar triangles PEF, E*er*, and KGF, G*gs*,

$$\text{As } PE=PN : EF :: Ee : er=\frac{EF}{PN}\times Ee;$$

$$\text{And } KG=KD : FG :: Gg : Gs=\frac{FG}{KD}\times Gg.$$

$$\text{But } er=Gs;\text{ therefore } \frac{EF}{PN}\times Ee=\frac{FG}{KD}\times Gg.$$

$$\text{Hence } Ee=\frac{PN\times FG}{KD\times EF}\times Gg.$$

And by ſubſtituting this value of E*e* in the former equation, we have the time of deſcribing $Ee=\frac{t\times PN\times FG\times Gg}{2KD\times EF\times\sqrt{BF\times 2PN}}$: But by the nature of the circle $FG=\sqrt{BF\times FN}$, and $EF=\sqrt{\overline{PN+PF}+FN}$. Hence, by ſubſtitution, we obtain the time of deſcribing

$$Ee=\frac{t\times PN\times\sqrt{BF\times FN}\times Gg}{2KD\times\sqrt{\overline{PN+PF}\times FN}\times\sqrt{BF\times 2PN}}=\frac{t\times\sqrt{PN}\times Gg}{2KD\times\sqrt{PN+PF}\times\sqrt{2}}=\frac{t\times\sqrt{2PN}\times Gg}{4KD\times\sqrt{PN+PF}}=\frac{t\times\sqrt{2PN}}{2BN\times\sqrt{2PN-NF}}\times Gg.$$

But NF, in its mean quantity for all the arches G*g*, is nearly equal to NK; for if the ſemicircle deſcribed on the diameter BN, which correſponds to the whole arch AN, be divided into an indefinite number of equal arches, G g, &c. the ſum of all the lines NF, will be equal to as many times NK, as there are arches in the ſemicircle equal to G g; therefore the time of deſcribing E $e = \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN - NK}} \times Gg$. Whence the time of deſcribing the arch AED $= \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN - NK}} \times BGN$; and the time of deſcribing the whole arch ADC, or the time of one vibration, is $= \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN - NK}} \times 2BGN$. But when the arch ANC is very ſmall, NK vaniſhes, and then the time of vibration in a very ſmall arc is $= \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN}} \times 2BGN = \frac{1}{2} t \times \frac{2BGN}{BN}$. Now if t be the time of deſcent through 2PN; then ſince the ſpaces deſcribed are as the ſquares of the times, $\frac{1}{2} t$ will be the time of deſcent throught $\frac{1}{2}$PN: therefore the diameter BN is to the circumference 2BGN, as the time of falling through half the length of the pendulum is to the time of one vibration.

Prop. IV. The length of a pendulum vibrating ſeconds is to twice the ſpace through which a body falls in one ſecond, as the ſquare of the diameter of a circle is to the ſquare of its circumference.

Let $d =$ diameter of a circle $= 1$, $c =$ circumference $= 3.14159$, &c. t to the time of one vibration, and p the length of the correſponding pendulum; then by the laſt propoſition $c : d :: 1'' : \frac{d}{c} =$ time of falling through half the length of the péndulum. Let $s =$ ſpace deſcribed by a body falling perpendicularly in the firſt ſecond: then ſince the ſpaces deſcribed are in the ſubduplicate ratio of the times of deſcription, therefore $1'' : \frac{d}{c} :: \sqrt{s} : \sqrt{\frac{1}{2}p}$. Hence $c^2 : d^2 :: 2s : p$.

It has been found by experiment, that in latitude $51\frac{1}{2}^{\circ}$ a body falls about 16.11 feet in the firſt ſecond: hence the length of a pendulum vibrating ſeconds in that latitude is $= \frac{32.22}{3.14159|^2} =$ 3 feet 3.174 inches.

Prop. V. The times of the vibrations of two pendulums in ſimilar arcs of circles are in a ſubduplicate ratio of the lengths of the pendulums.

Fig. 6.

Let PN, PO (fig. 6.) be two pendulums vibrating in the ſimilar arcs AB, CD; the time of a vibration of the pendulum PN is to the time of a vibration of the pendulum PO in a ſubduplicate ratio of PN to PO.

Since the arcs AN, CO are ſimilar and ſimilarly placed, the time of deſcent through AN will be to the time of deſcent through CO in the ſubduplicate ratio of AN to CO: but the times of deſcent through the arcs AN and CO are equal to half the times of vibration of the pendulums PN, PO reſpectively. Hence the time of vibration of the pendulum PN in the arc AB is to the time of vibration of the pendulum PO in the ſimilar arc CD in the ſubduplicate ratio of AN to CO: and ſince the radii PN, PO are proportional to the ſimilar arcs AN, Co, therefore the time of vibration of the pendulum PN will be to the time of vibration of the pendulum PO in a ſubduplicate ratio of PN to PO.

If the length of a pendulum vibrating ſeconds be 39.174 inches, then the length of a pendulum vibrating half ſeconds will be 9.793 inches. For $1'' : \frac{1}{2}'' :: \sqrt{39.174} : \sqrt{x}$; and $1 : \frac{1}{4} :: 39.174 : x$. Hence $x = \frac{39.174}{4} = 9.793$.

Prop. VI. The lengths of pendulums vibrating in the ſame time, in different places, will be as the forces of gravity.

For the velocity generated in any given time is directly as the force of gravity, and inverſely as the quantity of matter. Now the matter being ſuppoſed the ſame in both pendulums, the velocity is as the force of gravity; and the ſpace paſſed through in a given time will be as the velocity; that is, as the gravity.

Cor. Since the lengths of pendulums vibrating in the ſame time in ſmall arcs are as the gravitating forces, and as gravity increaſes with the latitude on account of the ſpheroidal figure of the earth and its rotation about its axis; hence the length of a pendulum vibrating in a given time will be variable with the latitude, and the ſame pendulum will vibrate ſlower the nearer it is carried to the equator.

Prop. VII. The time of vibrations of pendulums of the ſame length, acted upon by different forces of gravity, are reciprocally as the ſquare roots of the forces.

For when the matter is given, the velocity is as the force and time; and the ſpace deſcribed by any given force is as the force and ſquare of the time. Hence the lengths of pendulums are as the forces and the ſquares of the times of falling through them. But theſe times are in a given ratio to the times of vibration; whence the lengths of pendulums are as the forces and the ſquares of the times of vibration. Therefore, when the lengths are given, the forces will be reciprocally as the ſquare of the times, and the times of vibration reciprocally as the ſquare roots of the forces.

Cor. Let $p =$ length of pendulum, $g =$ force of gravity, and $t =$ time of vibration. Then ſince $p = g \times t^2$. Hence $g = p \times \frac{1}{t^2}$; and $t = \sqrt{p \times \frac{1}{g}}$.

That is, the forces in different places are directly as the lengths of the pendulums, and inverſely as the ſquare roots of the times of vibration; and the times of vibration are directly as the ſquare roots of the lengths of the pendulums, and inverſely as the ſquare roots of the gravitating forces.

Prop. VIII. A pendulum which vibrates in the arch of a cycloid deſcribes the greateſt and leaſt vibrations in the ſame time.

This property is demonſtrated only on a ſuppoſition that the whole maſs of the pendulum is concentrated in a point: but this cannot take place in any really vibrating body; and when the pendulum is of finite magnitude, there is no point given in poſition which determines the length of the pendulum; on the contrary the centre of oſcillation will not occupy the ſame place in the given body, when deſcribing different parts of the tract it moves through, but will continually be moved in reſpect of the pendulum itſelf during its vibration. It may, however, be obſerved, that Huyghens, aware that dulum

a pendulum ball ſuſpended at the end of a thread vibrating between cycloids, would not deſcribe a cycloid with its center of oſcillation, gave a very beautiful and ſimple method of ſuſpenſion, which ſecured its vibrations in that curve. Harriſon, whoſe authority is next, inſiſts on the advantage of wide vibrations, and in his own clocks, he always uſed cycloidal checks. This circumſtance has prevented any general determination of the time of vibration in a cycloidal arc, except in the imaginary caſe referred to.

There are many other obſtacles which concur in rendering the application of this curve to the vibration of pendulums deſigned for the meaſures of time the ſource of errors far greater than thoſe which by its peculiar property it is intended to obviate; and it is now wholly diſuſed in practice.

Although the times of vibration of a pendulum in different arches be nearly equal, yet from what has been ſaid, it will appear, that if the ratio of the leaſt of theſe arches to the greateſt be conſiderable, the vibrations will be formed in different times; and the differenee, though ſmall, will become ſenſible in the courſe of one or more days. In clocks uſed for aſtronomical purpoſes, it will therefore be neceſſary to obſerve the arc of vibration; which if different from that deſcribed by the pendulum when the clock keeps time, there a correction muſt be applied to the time ſhown by the clock. This correction, expreſſed in ſeconds of time, will be equal to the half of three times the difference of the ſquare of the given arc, and of that of the arc deſcribed by the pendulum when the clock keeps time, theſe arcs being expreſſed in degrees; and ſo much will the clock gain or loſe according as the firſt of theſe arches is leſs or greater than the ſecond.

Thus, if a clock keep time when the pendulum vibrates in the arch of 3^0, it will loſe $10\frac{1}{2}$ ſeconds daily in an arch of 4 degrees.

For $\overline{4^2-3^2}\times\frac{3}{2}=7\times\frac{3}{2}=10\frac{1}{2}$ ſeconds.

The length of a pendulum rod increaſes with heat; and the quantity of expanſion anſwering to any given degree of heat is experimentally found by means of a pyrometer †; but the degree of heat at any given time is ſhown by a thermometer: hence that inſtrument ſhould be placed within the clock caſe at a height nearly equal to that of the middle of the pendulum; and its height, for this purpoſe, ſhould be examined at leaſt once a day. Now by a table conſtructed to exhibit the daily quantity of acceleration or retardation of the clock anſwering to every probable height of the thermometer, the correſponding correction may be obtained. It is alſo neceſſary to obſerve, that the mean height of the thermometer during the interval ought to be uſed. In Six's thermometer this height may be eaſily obtained; but in thermometers of the common conſtruction it will be more difficult to find this mean.

† See Py-
meter,
EMI-
RY In-
x.

It had been found, by repeated experiments, that a braſs rod equal in length to a ſecond pendulum will expand or contract [illegible] part of an inch by a change of temperature of one degree in Fahrenheit's thermometer; and ſince the times of vibration are in a ſubduplicate ratio of the lengths of the pendulum, hence an expanſion or contraction of $\frac{1}{1000}$ part of an inch will anſwer nearly to one ſecond daily: therefore a change of one degree in the thermometer will occaſion a difference in the rate of the clock equal to one ſecond daily.

Where, if the clock be ſo adjuſted as to keep time when the thermometer is at 55°, it will loſe 10 ſeconds daily when the thermometer is at 65°, and gain as much when it is at 45°.

Hence the daily variation of the rate of the clock from ſummer to winter will be very conſiderable. It is true indeed that moſt pendulums have a nut or regulator at the lower end, by which the bob may be raiſed or lowered a determinate quantity; and therefore, while the height of the thermometer is the ſame, the rate of the clock will be uniform. But ſince the ſtate of the weather is ever variable, and as it is impoſſible to be raiſing or lowering the bob of the pendulum at every change of the thermometer, therefore the correction formerly mentioned is to be applied. This correction, however, is in ſome meaſure liable to a ſmall degree of uncertainty; and in order to avoid it altogether, ſeveral contrivances have been propoſed by conſtructing a pendulum of different materials, and ſo diſpoſing them that their effects may be in oppoſite directions, and thereby counterbalance each other; and by this means the pendulum will continue of the ſame length.

Mercurial Pendulum.

Mercurial PENDULUM. The firſt of theſe inventions is that by the celebrated Mr George Graham. In this, the rod of the pendulum is a hollow tube, into which a ſufficient quantity of mercury is introduced. Mr Graham firſt uſed a glaſs tube, and the clock to which it was applied was placed in the moſt expoſed part of the houſe. It was kept conſtantly going, without having the hands or pendulum altered, from the 9th of June 1722 to the 14th of October 1725, and its rate was determined by tranſits of fixed ſtars. Another clock made with extraordinary care, having a pendulum about 60 pounds weight, and not vibrating above one degree and a half from the perpendicular, was placed beſide the former, in order the more readily to compare them with each other, and that they might both be equally expoſed. The reſult of all the obſervations was this, that the irregularity of the clock with the quickſilver pendulum exceeded not, when greateſt, a ſixth part of that of the other clock with the common pendulum, but for the greateſt part of the year not above an eighth or ninth part; and even this quantity would have been leſſened, had the column of mercury been a little ſhorter: for it differed a little the contrary way from the other clock, going faſter with heat and ſlower with cold. To confirm this experiment more, about the beginning of July 1723 Mr Graham took off the heavy pendulum from the other clock, and made another with mercury, but with this difference, that inſtead of a glaſs tube he uſed a braſs one, and varniſhed the inſide to ſecure it from being injured by the mercury. This pendulum he uſed afterwards, and found it about the ſame degree of exactneſs as the other.

Philoſ. Tranſ. 1726. No. 392.

Gridiron Pendulum.

The *Gridiron* PENDULUM is an ingenious contrivance for the ſame purpoſe. Inſtead of one rod, this pendulum is compoſed of any convenient number of rods, as five, ſeven, or nine; being ſo connected, that the effect of one ſet of them counteracts that of the other ſet; and therefore, being properly adjuſted to each other, the centres of ſuſpenſion and oſcillation will always be equidiſtant. Fig. 7. repreſents a gridiron pendulum compoſed of nine rods, ſteel and braſs alternately. The two outer rods AB, CD, which are of ſteel, are faſtened to the croſs pieces AC, BD by

Fig. 7.

Pendulum. means of pins. The next two rods, EF, GH, are of braſs, and are faſtened to the lower bar BD, and to the second upper bar EG. The two following rods are of ſteel, and are faſtened to the croſs bars EG and IK. The two rods adjacent to the central rod being of braſs, are faſtened to the croſs pieces IK and LM; and the central rod, to which the ball of the pendulum is attached, is ſuſpended from the croſs piece LM, and paſſes freely through a perforation in each of the croſs bars IK, BD. From this diſpoſition of the rods, it is evident that, by the expanſion of the extreme rods, the croſs piece BD, and the two rods attached to it, will deſcend: but ſince theſe rods are expanded by the ſame heat, the croſs piece EG will conſequently be raiſed, and therefore alſo the two next rods; but becauſe theſe rods are alſo expanded, the croſs bar IK will deſcend; and by the expanſion of the two next rods, the piece LM will be raiſed a quantity ſufficient to counteract the expanſion of the central rod. Whence it is obvious, that the effect of the ſteel rods is to increaſe the length of the pendulum in hot weather, and to diminiſh it in cold weather, and that the braſs rods have a contrary effect upon the pendulum. The effect of the braſs rods muſt, however, be equivalent not only to that of the ſteel rods, but alſo to the part above the frame and ſpring, which connects it with the cock, and to that part between the lower part of the frame and the centre of the ball.

Mr Thiout. Another excellent contrivance for the ſame purpoſe is deſcribed in a French author on clock-making. It was uſed in the north of England by an ingenious artiſt about 40 years ago. This invention is as follows: A bar of the ſame metal with the rod of the pendulum, and of the ſame dimenſions, is placed againſt the back part of the clock caſe: from the top of this a part projects, to which the upper part of the pendulum is connected by two fine pliable chains or ſilken ſtrings, which juſt below paſs between two plates of braſs, whoſe lower edges will always terminate the length of the pendulum at the upper end. Theſe plates are ſupported on a pedeſtal fixed to the back of the caſe. The bar reſts upon an immoveable baſe at the lower part of the caſe; and is inſerted into a groove, by which means it is always retained in the ſame poſition. From this conſtruction, it is evident that the extenſion or contraction of this bar, and of the rod of the pendulum, will be equal, and in contrary directions. For ſuppoſe the rod of the pendulum to be expanded any given quantity by heat; then, as the lower end of the bar reſts upon a fixed point, the bar will be expanded upwards, and raiſe the upper end of the pendulum juſt as much as its length was increaſed; and hence its length below the plates will be the ſame as before.

Of this pendulum, ſomewhat improved by Mr Croſthwaite watch and clock maker, Dublin, we have the following deſcription in the Tranſactions of the Royal Iriſh Academy, 1788.—"A and B (fig. 8.) are two rods of ſteel forged out of the ſame bar, at the ſame time, of the ſame temper, and in every reſpect ſimilar. On the top of B is formed a gibbet C; this rod is firmly ſupported by a ſteel bracket D, fixed on a large piece of marble E, firmly ſet into the wall F, and having liberty to move freely upwards between croſs ſtaples of braſs, 1, 2, 3, 4, which touch only in a point in front and rear (the ſtaples having been carefully formed for that purpoſe); to the other rod is firmly fixed by its centre the lens G, of 24 pounds weight, although it ſhould in ſtrictneſs be a little below it. This pendulum is ſuſpended by a ſhort ſteel ſpring on the gibbet at C; all which is entirely independent of the clock. To the back of the clock plate I are firmly ſcrewed two cheeks nearly cycloidal at K, exactly in a line with the centre of the verge L. The maintaining power is applied by a cylindrical ſteel ſtud, in the uſual way of regulators, at M. Now, it is very evident, that any expanſion or contraction that takes place in either of theſe exactly ſimilar rods, is inſtantly counteracted by the other; whereas in all *compenſation* pendulums compoſed of different materials, however juſt calculation may ſeem to be, that can never be the caſe, as not only different metals, but alſo different bars of the ſame metal, that are not manufactured at the ſame time, and exactly in the ſame manner, are found by a good pyrometer to differ materially in their degrees of expanſion and contraction, a very ſmall change affecting one and not the other."

Fig. 8.

Fir Pendulum. The expanſion or contraction of ſtraight grained fir wood lengthwiſe, by change of temperature, is ſo ſmall, that it is found to make very good pendulum rods. The wood called *ſapadillo* is ſaid to be ſtill better. There is good reaſon to believe, that the previous baking, varniſhing, gilding, or ſoaking of theſe woods in any melted matter, only tends to impair the property that renders them valuable. They ſhould be ſimply rubbed on the outſide with wax and a cloth. In pendulums of this conſtruction the error is greatly diminiſhed, but not taken away.

Angular Pendulum. *Angular* PENDULUM, is formed of two pieces of legs like a ſector, and is ſuſpended by the angular point. This pendulum was invented with a view to diminiſh the length of the common pendulum, but at the ſame time to preſerve or even increaſe the time of vibration. In this pendulum, the time of vibration depends on the length of the legs, and on the angle contained between them conjointly, the duration of the time of vibration increaſing with the angle. Hence a pendulum of this conſtruction may be made to oſcillate in any given time. At the lower extremity of each leg of the pendulum is a ball or bob as uſual. It may be eaſily ſhown, that in this kind of a pendulum, the ſquares of the times of vibration are as the ſecants of half the angle contained by the legs: hence if a pendulum of this conſtruction vibrates half ſeconds when its legs are cloſe, it will vibrate whole ſeconds when the legs are opened, ſo as to contain an angle equal to 151° $2\frac{1}{2}'$.

Conical or Circular Pendulum. *The Conical or Circular* PENDULUM, is ſo called from the figure deſcribed by the ſtring or ball of the pendulum. This pendulum was invented by Mr Huygens, and is alſo claimed by Dr Hooke.

In order to underſtand the principles of this pendulum, it will be neceſſary to premiſe the following lemma, viz. the times of all the circular revolutions of a heavy globular body, revolving within an inverted hollow paraboloid, will be equal, whatever be the radii of the circle, deſcribed by that body.

In order therefore, to conſtruct the pendulum ſo that its ball may always deſcribe its revolutions in a paraboloid ſurface, it will be neceſſary that the rod of the pendulum be flexible, and that it be ſuſpended in

Fig. 1.

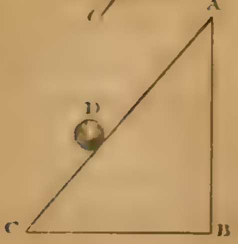


Fig. 2.

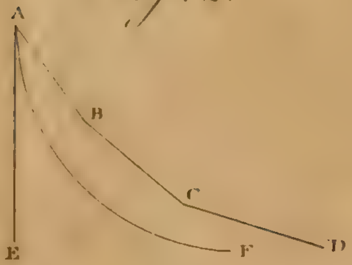


Fig. 8.

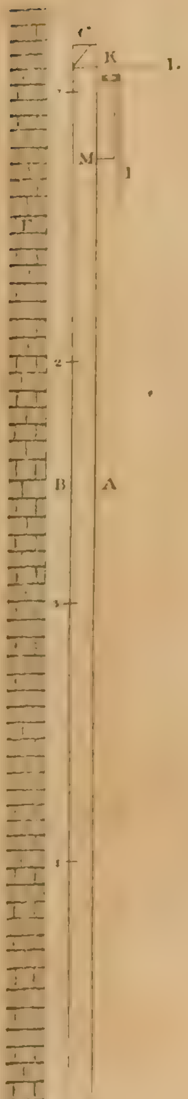


Fig. 7.

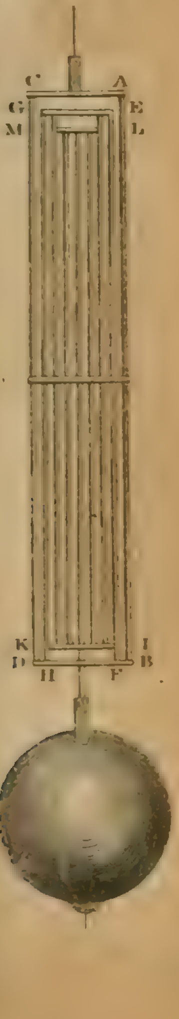


Fig. 3.

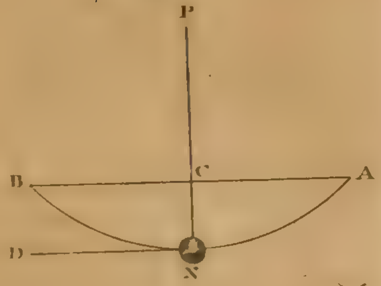


Fig. 4.

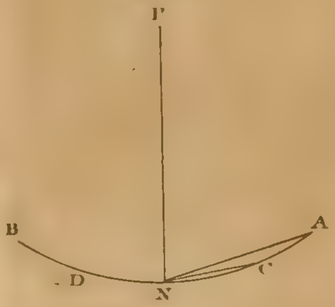


Fig. 5.

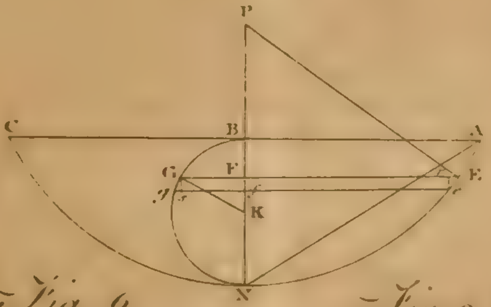


Fig. 6.

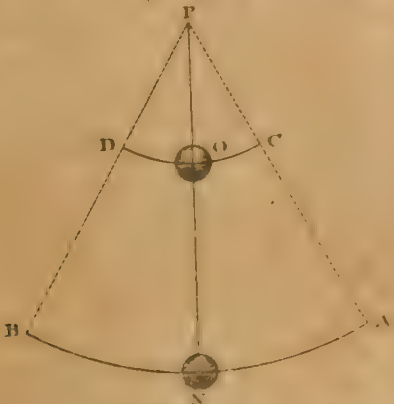
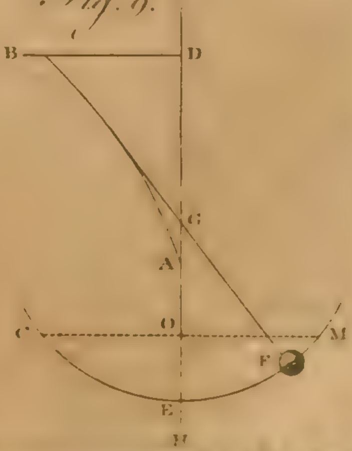


Fig. 9.



A. Bell Prin. Wal. Sculptor fecit

Fig. 9.

ſuch a manner as to form the evolute of the given parabola. Hence, let KH (fig. 9.) be an axis perpendicular to the horizon, having a pinion at K moved by the laſt wheel in the train of the clock; and a hardened ſteel point at H moving in an agate pivot, to render the motion as free as poſſible. Now, let it be required that the pendulum ſhall perform each revolution in a ſecond, then the paraboloid ſurface it moves in muſt be ſuch whoſe *latus rectum* is double the length of the common half ſecond pendulum. Let O be the focus of the parabola MEC, and MC the *latus rectum*; and make AE=MO=¼MC=the length of a common half ſecond pendulum. At the point A of the verge, let a thin plate AB be fixed at one end, and at the other end B let it be faſtened to a bar or arm BD perpendicular to DH, and to which it is fixed at the point D. The figure of the plate AB is that of the evolute of the given parabola MEC.

The equation of this evolute, being alſo that of the ſemicubical parabola, is $\frac{27}{16}p\,x^2=y^3$.—Let $\frac{27}{16}p=P$; then $P\,x^2=y^3$, and in the focus $P=2\,y$. In this caſe $2\,x^2=y^3=\frac{1}{4}P^3$: hence $x^4=\frac{1}{8}P^2$, and $x=P\sqrt{\frac{1}{8}}=\frac{27}{16}p\sqrt{\frac{1}{8}}$=the diſtance of the focus from the vertex A.—By aſſuming the value of x, the ordinates of the curve may be found; and hence it may be eaſily drawn.

The ſtring of the pendulum muſt be of ſuch a length that when one end is fixed at B, it may lie over the plate AB, and then hang perpendicular from it, ſo that the centre of the bob may be at E when at reſt. Now, the verge KH being put into motion, the ball of the pendulum will begin to gyrate, and thereby conceive a centrifugal force which will carry it out from the axis to ſome point F, where it will circulate ſeconds or half ſeconds, according as the line AE is 9.8 inches, or 2¼ inches, and AB anſwerable to it.

One advantage poſſeſſed by a clock having a pendulum of this conſtruction is, that the ſecond hand moves in a regular and uniform manner, without being ſubject to thoſe jerks or ſtarts as in common clocks; and the pendulum is entirely ſilent.

Theory has pointed out ſeveral other pendulums, known by the name of *Elliptic*, *Horizontal*, *Rotulary*, &c. pendulums. Theſe, however, have not as yet attained that degree of perfection as to ſupplant the common pendulum.

Obſerving that both the gridiron and mercurial pendulums are ſubject to many inconveniences and errors, Mr Kater has attempted to conſtruct one poſſeſſing ſuch properties in reſpect of cheapneſs and accuracy as he thinks might juſtly give it the preference to any other. As wood poſſeſſes a leſs degree of expanſibility by means of heat than any other ſubſtance; on this account, if it could be rendered quite impervious to moiſture, it would be the beſt of all ſubſtances for the rod of a pendulum; and as it alſo appears that zinc, above all other metals, poſſeſſes the greateſt degree of expanſibility by means of heat, he conſidered it the beſt ſubſtance which could be employed for a compenſation. His next object was to inſtitute a ſet of delicate experiments, in order to aſcertain the preciſe degree of the expanſibility of wood by the application of heat, and he diſcovered by the uſe of a pyrometer, that a rod of very dry, well ſeaſoned white wood, four feet long, three-fourths of an inch broad, and one-fourth of an inch thick, when expoſed in an oven to the temperature of 235°, had contracted. Being again put into the oven, where it was permitted to remain for a long time, till it became a little diſcoloured, with a view to diſſipate the whole of the moiſture, it was placed in the pyrometer, and allowed to remain till it reached the temperature of the room, or 49°, when it was found to have contracted 0.0205 of an inch with 186° of Fahrenheit, from which we obtain by proportion 0.0049 of an inch for the expanſion of one foot with 180° difference of temperature. Thus,

$$\frac{0.0205\times180}{186}=\frac{0.0198}{4}=0.0049.$$

But for a general deſcription of this pendulum, and a full account of the manner in which it is conſtructed, we muſt refer our readers to the inventor's own paper, Nichol. Jour. vol. xx. p. 214.

Beſides the uſe of the pendulum in meaſuring time, it has alſo been ſuggeſted as a proper ſtandard for meaſures of length. See MEASURE.

PENEA, a genus of plants belonging to the tetrandria claſs, and in the natural method ranking with thoſe of which the order is doubtful. See BOTANY *Index*.

PENELOPE, in *Fabulous Hiſtory*, the daughter of Icarus, married Ulyſſes, by whom ſhe had Telemachus. During the abſence of Ulyſſes, who was gone to the ſiege of Troy, and who ſtaid 20 years from his dominions, ſeveral princes charmed with Penelope's beauty, told her that Ulyſſes was dead, offered to marry her, and preſſed her to declare in their favour. She promiſed compliance on condition they would give her time to finiſh a piece of tapeſtry ſhe was weaving; but at the ſame time ſhe undid in the night what ſhe had done in the day, and by this artifice eluded their importunity till Ulyſſes's return.

PENELOPE, a genus of birds of the order of *gallinæ*. See ORNITHOLOGY *Index*.

PENESTICA, (Antonine), a town of the Helvetii, ſituated between the Lacus Lauſonius and Salodurum; called *Peteniſca* by Peutinger. Thought now to be *Biel*, (Cluverius); the capital of a ſmall territory in Swiſſerland.

PENEUS, (Strabo); a river running through the middle of Theſſaly, from weſt to eaſt, into the Sinus Thermaicus, between Olympus and Oſſa, near Tempe of Theſſaly, riſing in Mount Pindus, (Ovid, Val. Flaccus).

PENETRALE, a ſacred room or chapel in private houſes, which was ſet apart for the worſhip of the houſehold gods among the ancient Romans. In temples alſo there were *penetralia*, or apartments of diſtinguiſhed ſanctity, where the images of the gods were kept, and certain ſolemn ceremonies performed.

PENGUIN, or PINGUIN. See PENGUIN, ORNITHOLOGY *Index*.

PENICILLUS, among ſurgeons, is uſed for a tent to be put into wounds or ulcers.

PENIEL, or PENUEL, a city beyond Jordan, near the ford or brook Jabbok. This was the occaſion of its name. Jacob, upon his return from Meſopotamia, (Gen. xxxii. 24, &c.) made a ſtop at the brook Jabbok: and very early the next morning, after he had ſent all the people before, he remained alone, and behold an angel came, and wreſtled with him till the day began to appear. Then the angel ſaid to Jacob, Let me go, for the morning begins to appear. Jacob anſwered, I ſhall not let you go from me till you have given me your bleſſing. The angel bleſſed him then in the ſame place, which Jacob thence called Peniel, ſaying, I have ſeen God face to face, yet continue alive.

In following ages the Iſraelites built a city in this place, which was given to the tribe of Gad. Gideon, returning from the purſuit of the Midianites, overthrew the tower of Peniel, (Judges viii. 17), and put all the inhabitants of the city to death, for having refuſed ſuſtenance to him and his people, and having anſwered him in a very inſulting manner. Jeroboam the ſon of Nebat rebuilt the city of Peniel, (1 King xii. 25.). Joſephus ſays, that this prince there built himſelf a palace.

PENINNAH, the ſecond wife of Elkanah, the father of Samuel. Peninnah had ſeveral children, (1 Sam. i. 2, 3, &c.), but Hannah, who afterwards was mother of Samuel, was for a great while barren: Peninnah, inſtead of giving the glory to God, the author of fruitfulneſs, was elevated with pride, and inſulted her rival Hannah. But the Lord having viſited Hannah, Peninnah was thereupon humbled: and ſome interpreters think, that God took away her children from her, or at leaſt that ſhe had no more after this time, according to the words of the ſong of Hannah, (1 Sam. ii. 5.), "The barren hath born ſeven, and ſhe that hath many children is waxed feeble."

PENINSULA, in *Geography*, a portion or extent of land joining to the continent by a narrow neck or iſthmus, the reſt being encompaſſed with water.

PENIS, in *Anatomy*. See ANATOMY *Index*.

PENITENCE, is ſometimes uſed for a ſtate of repentance, and ſometimes for the act of repenting. See REPENTANCE. It is alſo uſed for a diſcipline, or puniſhment attending repentance; more uſually called *penance*. It alſo gives title to ſeveral religious orders, conſiſting either of converted debauchees, and reformed proſtitutes, or of perſons who devote themſelves to the office of reclaiming them. Of this latter kind is the

Order of PENITENCE *of St Magdalen*, eſtabliſhed about the year 1272 by one Bernard, a citizen of Marſeilles, who devoted himſelf to the work of converting the courtezans of that city. Bernard was ſeconded by ſeveral others; who, forming a kind of ſociety, were at length erected into a religious order by Pope Nicholas III. under the rule of St Auguſtine. F. Geſnay ſays, that they alſo made a religious order of the penitents, or women they converted, giving them the ſame rules and obſervances which they themſelves kept.

Congregation of PENITENCE *of St Magdalen at Paris*, owed its riſe to the preaching of F. Tiſſeran, a Franciſcan, who converted a vaſt number of courtezans about the year 1492. Louis duke of Orleans gave them his houſe for a monaſtery; or rather, as appears by their conſtitutions, Charles VIII. gave them the hotel called *Bochaigne*, whence they were removed to St George's chapel, in 1572. By virtue of a brief of Pope Alexander, Simon biſhop of Paris, in 1497, drew up for them a body of ſtatutes, and gave them the rule of St Auguſtine. It was neceſſary, before a woman could be admitted, that ſhe had firſt committed the ſin of the fleſh. None were admitted who were above 35 years of age. Till the beginning of the laſt century, none but penitents were admitted; but ſince its reformation by Mary Alvequin, in 1616, none have been admitted but maids, who, however, ſtill retain the ancient name penitents.

PENITENTS, an appellation given to certain fraternities of penitents diſtinguiſhed by the different ſhape and colour of their habits. Theſe are ſecular ſocieties, who have their rules, ſtatutes, and churches, and make public proceſſions under their particular croſſes or banners. Of theſe there are more than a hundred, the moſt conſiderable of which are as follow: the white penitents, of which there are ſeveral different ſorts at Rome, the moſt ancient of which was conſtituted in 1264; the brethren of this fraternity every year give portions to a certain number of young girls, in order to their being married: their habit is a kind of white ſackloth, and on the ſhoulder is a circle, in the middle of which is a red and white croſs. Black penitents, the moſt conſiderable of which are the brethren of mercy, inſtituted in 1488 by ſome Florentines, in order to aſſiſt criminals during their impriſonment, and at the time of their death: on the day of execution, they walk in proceſſion before them, ſinging the ſeven penitential pſalms and the litanies; and after they are dead, they take them down from the gibbet and bury them; their habit is black ſackcloth. There are others whoſe buſineſs it is to bury ſuch perſons as are found dead in the ſtreets: theſe wear a death's head on one ſide of their habit. There are alſo blue, gray, red, green, and violet penitents; all of whom are remarkable for little elſe beſides the different colours of their habits.

Mabillon tells us, that at Turin there are a ſet of penitents kept in pay to walk through the ſtreets in proceſſion, and cut their ſhoulders with whips, &c.

PENITENTS, or *Converts of the Name of Jeſus*, a congregation of religious at Seville in Spain, conſiſting of women who had led a licentious life, founded in 1550. This monaſtery is divided into three quarters: one for profeſſed religious; another for novices; a third for thoſe who are under correction. When theſe laſt give ſigns of a real repentance, they are removed into the quarter of the novices, where, if they do not behave themſelves well, they are remanded to their correction. They obſerve the rule of St Auguſtine.

PENITENTS of Orvieto, are an order of nuns, inſtituted by Antony Simoncelli, a gentleman of Orvieto in Italy. The monaſtery he built was at firſt deſigned for the reception of poor girls, abandoned by their parents, and in danger of loſing their virtue. In 1662 it was erected into a monaſtery, for the reception of ſuch as, having abandoned themſelves to impurity, were willing to take up, and conſecrate themſelves to God by ſolemn vows. Their rule is that of the Carmelites.

Theſe religious have this in peculiar, that they undergo no noviciate. All required is, that they continue a few months in the monaſtery in a ſecular habit; after which they are admitted to the vows.

PENITENTIAL, an eccleſiaſtical book, retained among the Romaniſts; in which is preſcribed what relates to the impoſition of penance and the reconciliation of penitents. See PENANCE.

There are various penitentials, as the Roman penitential, that of the venerable Bede, that of Pope Gregory III. &c.

PENITENTIARY, in the ancient Chriſtian church, Penitentiary ‖ Penn.

a name given to certain preſbyters or prieſts, appointed in every church to receive the private confeſſions of the people, in order to facilitate public diſcipline, by acquainting them what ſins were to be expiated by public penance, and to appoint private penance for ſuch private crimes as were not proper to be publicly cenſured.

Penitentiary, at the court of Rome, is an office in which are examined and delivered out the ſecret bulls, graces, or diſpenſations relating to caſes of conſcience, confeſſions, &c.

Penitentiary, is alſo an officer, in ſome cathedrals, veſted with power from the biſhop to abſolve, in caſes reſerved to him. The pope has at preſent his grand penitentiary, who is a cardinal, and the chief of the other penitentiary prieſts eſtabliſhed in the church of Rome, who conſult him in all difficult caſes. He preſides in the penitentiary, diſpatches diſpenſations, abſolutions, &c. and has under him a regent and 24 proctors, or advocates of the ſacred penitentiary.

PENMAN-Mawr, a mountain in Caernarvonſhire, 1400 feet high. It hangs perpendicularly over the ſea, at ſo vaſt a height, that few ſpectators are able to look down the dreadful ſteep. On the ſide which is next the ſea, there is a road cut out of the ſide of the rock, about ſix or ſeven feet wide, which winds up a ſteep aſcent, and uſed to be defended on one ſide only by a ſlight wall, in ſome parts about a yard high, and in others by only a bank, that ſcarce roſe a foot above the road. The ſea was ſeen daſhing its waves 40 fathoms below, with the mountain riſing as much above the traveller's head. This dangerous road was a few years ago ſecured by a wall breaſt-high, to the building of which the city of Dublin largely contributed, it being in the high road to Holyhead.

PENN, William, an eminent writer among the Quakers, and the planter and legiſlator of Penſylvania, was the ſon of Sir William Penn, and was born at London in 1644. In 1660, he was entered a gentleman of Chriſt-Church, in Oxford; but having before received an impreſſion from the preaching of one Thomas Loe a Quaker, withdrew with ſome other ſtudents from the national worſhip, and held private meetings, where they preached and prayed amongſt themſelves. This giving great offence to the heads of the college, Mr Penn, though but 16 years of age, was fined for nonconformity; and continuing his religious exerciſes, was at length expelled his college. Upon his return home, he was, on the ſame account, treated with great ſeverity by his father, who at laſt turned him out of doors; but his reſentment afterwards abating, he ſent him to France in company with ſome perſons of quality; where he continued a conſiderable time, and returned not only well ſkilled in the French language, but a polite and accompliſhed gentleman. About the year 1666, his father committed to his care a conſiderable eſtate in Ireland. Being found in one of the Quakers meetings in Cork, he, with many others, was thrown into priſon; but on his writing to the earl of Orrery, was ſoon diſcharged. However, his father being informed he ſtill adhered to his opinions, ſent for him to England and finding him inflexible to all his arguments, turned him out of doors a ſecond time. About the year 1668, he became a public preacher among the Quakers; and that year was committed cloſe priſoner to the Tower, where he wrote ſeveral treatiſes. Being diſcharged after ſeven months impriſonment, he went to Ireland, where he alſo preached amongſt the Quakers. Returning to England, he was in 1670 committed to Newgate, for preaching in Gracechurch-ſtreet meeting-houſe, London; but being tried at the ſeſſions-houſe of the Old Bailey. he was acquitted. In September the ſame year, his father died; and being perfectly reconciled to him, left him both his paternal bleſſing and a good eſtate. But his perſecutions were not yet at an end; for in 1671 he was committed to Newgate for preaching at a meeting in Wheeler ſtreet, London; and during his impriſonment, which continued ſix months, he alſo wrote ſeveral treatiſes. After his diſcharge, he went into Holland and Germany; and in the beginning of the year 1672, married and ſettled with his family at Rickmanſworth in Hertfordſhire. The ſame year he publiſhed ſeveral pieces; and particularly one againſt Reeve and Muggleton. In 1677, he again travelled into Holland and Germany in order to propagate his opinions; and had frequent converſations with the princeſs Elizabeth, daughter to the queen of Bohemia, and ſiſter to the princeſs Sophia, mother to King Geo. I. In 1681, King Charles II. in conſideration of the ſervices of Mr Penn's father, and ſeveral debts due to him from the crown at the time of his deceaſe, granted Mr Penn and his heirs the province lying on the weſt ſide of the river Delaware in North America, which from thence obtained the name of *Penſylvania*. Upon this Mr Penn publiſhed a brief account of that province, with the king's patent; and propoſing an eaſy purchaſe of lands, and good terms of ſettlement for ſuch as were inclined to remove thither, many went over. Theſe having made and improved their plantations to good advantage, the governor, in order to ſecure the planters from the native Indians, appointed commiſſioners to purchaſe the land he had received from the king of the native Indians, and concluded a peace with them. The city of Philadelphia was planned and built; and he himſelf drew up the fundamental conſtitutions of Penſylvania in 24 articles. In 1681, he was elected a member of the Royal Society; and the next year he embarked for Penſylvania, where he continued about two years, and returned to England in Auguſt 1684. Upon the acceſſion of King James to the throne, he was taken into a great degree of favour with his majeſty, which expoſed him to the imputation of being a Papiſt; but from which he fully vindicated himſelf. However, upon the Revolution, he was examined before the council in 1688, and obliged to give ſecurity for his appearance on the firſt day of next term, which was afterwards continued. He was ſeveral times diſcharged and examined; and at length warrants being iſſued out againſt him, he was obliged to conceal himſelf for two or three years. Being at laſt permitted to appear before the king and council, he repreſented his innocence ſo effectually that he was acquitted. In Auguſt 1699, he, with his wife and family, embarked for Penſylvania; whence he returned in 1701, in order to vindicate his proprietary right, which had been attacked during his abſence. Upon Queen Anne's acceſſion to the crown, he was in great favour with her, and was often at court. But, in 1707, he was involved in a lawſuit with the executors of a perſon who had been formerly his ſteward; and, though many thought him aggrieved, the court of chancery did not think proper to relieve him: upon which account he was obliged to live

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within the rules of the Fleet for ſeveral months, till the matter in diſpute was accommodated. He died in 1718.

At one period of his life, Penn lodged in a houſe in Norfolk-ſtreet in the Strand. In the entrance to it he had a peeping-hole, through which he could ſee any perſon that came to him. A creditor one day ſent in his name, and having been made to wait more than a reaſonable time, he knocked for the ſervant, whom he aſked, "Will not thy maſter ſee me?" "Friend (anſwered the ſervant) he has ſeen thee, but he does not like thee."

Mr Penn's friendly and pacific manner of treating the Indians produced in them an extraordinary love for him and his people; ſo that they have maintained a perfect amity with the Engliſh in Penſylvania ever ſince. He was the greateſt bulwark of the Quakers; in whoſe defence he wrote numberleſs pieces. Beſides the above works, he wrote a great number of others; the moſt eſteemed of which are, 1. His Primitive Chriſtianity revived. 2. His defence of a paper, intitled *Goſpel Truths, againſt the Exceptions of the Biſhop of Cork.* 3. His Perſuaſive to Moderation. 4. His Good Advice to the Church of England, Roman Catholic, and Proteſtant Diſſenter. 5. The Sandy Foundation ſhaken. 6. No Croſs, no Crown. 7. The great Caſe of Liberty of Conſcience debated. 8. The Chriſtian Quaker and his Teſtimony ſtated and vindicated. 9. A Diſcourſe of the general Rule of Faith and Practice, and Judge of Controverſy. 10. England's Preſent Intereſt conſidered. 11. An Addreſs to Proteſtants. 12. His Reflections and Maxims. 13. His Advice to his Children. 14. His Riſe and Progreſs of the People called *Quakers*. 15. A Treatiſe on Oaths. Moſt of theſe have paſſed ſeveral editions, ſome of them many. The letters between William Penn and Dr Tillotſon, and William Penn and William Popple, Eſq. together with Penn's letters to the princeſs Elizabeth of the Rhine, and the counteſs of Hornes, as alſo one to his wife on his going to Penſylvania, are inſerted in his works, which were firſt collected and publiſhed in 2 vols. folio; and the parts ſince ſelected and abridged into 1 vol. folio, are very much and deſervedly admired for the good ſenſe they contain.

PENNANT, Thomas, Eſq. a celebrated naturaliſt, was born in Flintſhire, about the year 1726. His family had their reſidence in that country for ſeveral hundred years; and he informs us himſelf, that he acquired the rudiments of his education at Wrexham, from whence he was ſent to Fulham. Not long after this he went to the univerſity of Oxford, where his progreſs in claſſical knowledge was very conſiderable; after which he turned his attention to the ſtudy of juriſprudence; but it is no where ſaid that he ever followed the law as a profeſſion.

We are informed that his taſte for natural hiſtory, for his knowledge of which he afterwards became ſo conſpicuous, was firſt excited by the peruſal of Willoughby's Ornithology, a copy of which had been ſent him in a preſent. He began his travels at home, which was certainly the moſt proper ſtep, to acquire a knowledge of the manners, curioſities, and productions of his native country, before he attempted to delineate thoſe of any other nation. He then viſited the continent, where he acquired additional knowledge reſpecting his moſt favourite ſtudies, and became acquainted with ſome of the moſt celebrated literary characters which that period produced. When he returned home he married and had two children; but he was 57 years of age before he gained poſſeſſion of the family eſtate, after which he took up his reſidence at Downing.

On the death of his wife he ſet out again for the continent, where he became acquainted with Voltaire, Buffon, Pallas, and other eminent characters. Being an author as early as the year 1750 (then only 24 years of age), he had acquired a conſiderable degree of reputation in that capacity, by the time he became acquainted with the forementioned philoſophers. His reputation as a naturaliſt was eſtabliſhed by his Britiſh Zoology in four vols. 4to, and ſtill farther increaſed by his epiſtolary correſpondence with ſo great a man as Linnæus. He undertook a tour to Cornwall at an early period of life, and alſo felt an irreſiſtible propenſity to ſurvey the works of nature in the northern parts of the kingdom. For this purpoſe he ſet out for Scotland in 1771, and publiſhed an amuſing account of his tour in three vols. 4to. which was deſtined to receive ſuch a ſhare of public favour as to paſs through ſeveral editions. His Welch tour was publiſhed in 1778, and his journey from Cheſter to London in 1782, in one volume 4to. About 1784 came out his Arctic Zoology, a work which was very much eſteemed, both in his own, and in many other countries. He alſo gave the world a natural hiſtory of the pariſhes of Holywell and Downing, within the latter of which he had reſided for more than 50 years. Not long before his death appeared his View of Hindoſtan, in two vols. 4to, to undertake which it ſeems he had ſolicitations from private friends, as well as the wiſhes of perſons entirely unknown to him, which were expreſſed in the public prints. This was unqueſtionably a very bold attempt in a man who was turned of 70, a period at which the faculties of the mind muſt certainly be impaired, eſpecially when exerted with vigour for ſuch a number of years before. Notwithſtanding his great age, however, the work is executed in an able manner, bearing a ſtrong reſemblance to the introduction of his Arctic Zoology.

He alſo publiſhed a letter on the earthquake which was felt at Downing in Flintſhire, in the year 1753; another which was inſerted in the Philoſophical Tranſactions in 1756; his Synopſis of Quadrupeds in 1771; a pamphlet on the militia; a paper on the turkey, and a miſcellaneous volume.

Almoſt every ſpecies of literary honour was conferred upon him; for he was complimented with the degree of L L. D. by the univerſity in which he was educated; he was alſo fellow of the Royal Society, and a member of the Society of Antiquaries; a fellow of the Royal Society of Upſal in Sweden; a member of the American Philoſophical Society; an honorary member of the Anglo-Linnæan Society, &c. &c.

He was enabled to exhibit the greateſt hoſpitality at his table, in conſequence of the ample fortune which was left him at his father's deceaſe, and he gave the profits ariſing from the ſale of ſeveral publications to charitable endowments. By his generous patronage a number of engravers met with great encouragement, and he contributed not a little to the promotion of the fine arts. About the age of 50 he married for the ſecond time, a Miſs Moſtyn, ſiſter of his neighbour, the late Sir Roger Moſtyn of Flintſhire. The concluding part of his life was cheerful, and it may be affirmed that he ſcarcely felt the advances of old age. He died at his ſeat at Downing in 1798, and in the 72d year of his age.

He inherited from nature a ſtrong and vigorous conſtitution; his countenance was open and intelligent; his diſpoſition active and cheerful; and his vivacity, both in writing and converſation, made him perpetually entertaining. His heart was kind and benevolent, and in the relations of domeſtic life his conduct was highly worthy of imitation. The diſtreſſes in which his poor neighbours were at any time involved gave him unfeigned uneaſineſs, and he endeavoured to relieve them by every means in his power, He was poſſeſſed of candour, and free from common prejudices, a truth fully evinced in all his publications. The people of Scotland were proud to confeſs, that he was the firſt Engliſh traveller who had fairly repreſented their country in its favourable, as well as in its leſs pleaſing appearances. His ſtyle is lively, and fitted to convey the ideas which he intended to expreſs, but it is not always correct. In zoology his arrangement is judicious, and his deſcriptions characteriſtic. If we diſcover ſeveral traces of vanity in thoſe works which he publiſhed near the cloſe of life, it ought to be remembered that it is the vanity of an old man, which is ſeldom diſagreeable; and it is alſo the vanity of one who in the meridian of life gave the world ſuch fruits of his labours as will be juſtly admired in all ſucceeding ages, while a taſte for polite and valuable literature is cheriſhed among men.

PENNATULA, or SEA-PEN, a genus of animals belonging to the order zoophyta. See HELMINTHOLOGY *Index*.

PENNI, GIOVANNI FRANCISCO, born at Florence in 1488, was the diſciple of Raphael, who obſerving his genius and integrity, intruſted his domeſtic concerns entirely to his management; by which means he got the appellation of *il fatore*, or the "ſteward," which he retained ever after. The genius of Penni was univerſal; but his greateſt pleaſure was in painting landſcapes and buildings: he was an excellent deſigner, and coloured extremely well in oil, diſtemper, and freſco. He painted portraits in an exquiſite ſtyle; and had ſuch happy natural talents, that Raphael left him heir to his fortune in partnerſhip with Julio Romano his fellow-diſciple. After Raphael's death, Penni painted many pictures at Rome, particularly in the palace of Chigi, ſo exactly in the ſtyle of his maſter, that they might not undeſervedly have been imputed to him: he finiſhed, in conjunction with Julio and Pierino del Vaga, the celebrated deſigns of the battles of Conſtantine, and others, which Raphael had left imperfect; but differing with them about a copy of the transfiguration, which the pope intended for the king of France, they ſeparated. Penni went to Naples; but the air of that country diſagreeing with his conſtitution, he died ſoon after in 1528. He had a brother called *Lucca Penni*, who worked at Genoa and other parts of Italy in conjunction with Pierino del Vaga, who married his ſiſter; he went thence to England, where he worked for Henry VIII. and for ſeveral merchants; was employed by Francis I. at Fontainbleau; but at laſt quitted the pencil, and devoted himſelf to engraving.

PENNY, or PENY, in commerce, an ancient Engliſh coin, which had formerly conſiderable currency; but is now generally dwindled into an imaginary money, or money of account. Camden derives the word from the Latin *pecunia*, "money."

The Ancient Engliſh penny, penig, or pening, was the firſt ſilver coin ſtruck in England; nay, and the only one current among our Saxon anceſtors: as is agreed by Camden, Spelman, Dr Hicks, &c.

The penny was equal in weight to our three-pence; five of them made one ſhilling, or ſcilling Saxon; 30 a mark or mancuſe, equal to 7s. 6d.

Till the time of King Edw. I. the penny was ſtruck with a croſs, ſo deeply indented in it, that it might be eaſily broke, and parted, on occaſion, into two parts, thence called *half-pennies*; or into four, thence called *fourthings* or *farthings*.—But that prince coined it without indenture, in lieu of which, he firſt ſtruck round halfpence and farthings.

He alſo reduced the weight of the penny to a ſtandard; ordering that it ſhould weigh 32 grains of wheat, taken out of the middle of the ear.—This penny was called the *penny ſterling*.—Twenty of theſe pence were to weigh an ounce; whence the penny became a weight as well as a coin. See STERLING and *PENNY-Weight*.

The penny ſterling was long diſuſed as a coin; and was ſcarce known, but as a money of account, containing the twelfth part of a ſhilling; but of late years it has been introduced into the Britiſh current coin.

PENNY, in ancient ſtatutes, &c. is uſed for all ſilver money. And hence the *ward-penny*, *aver-penny*, *hundred-penny*, *tithing-penny*, and *brothal-penny*.

PENNY-Weight, a Troy weight, containing twenty-four grains; each grain weighing a grain of wheat gathered out of the middle of the ear, well dried. The name took its riſe hence, that this was anciently the weight of one of our ancient ſilver pennies. See PENNY.

Twenty of theſe penny-weights make an ounce Troy.

PENRITH, an ancient town of the county of Cumberland in England, ſeated under a hill called *Penrith-Fell*, near the rivers Eamont and Lowther. It is a great thoroughfare for travellers; but has little other trade, except tanning, and a ſmall manufacture of checks. Formerly it had a caſtle, but it is now in ruins. In the churchyard is a monument of great antiquity, conſiſting of two ſtone pillars 11 feet 6 inches high, and 5 in circumference in the lower part, which is rounded; the upper is ſquare, and tapers to a point; in the ſquare part is ſome fretwork, and the relievo of a croſs; and on the interior ſide of one is the faint repreſentation of ſome animal. But theſe ſtones are mortiſed at their lower part into a round one: they are about 15 feet aſunder, and the ſpace between them is incloſed on each ſide with two very large but thin ſemicircular ſtones; ſo that there is left between pillar and pillar a walk of two feet in breadth. Two of theſe leſſer ſtones are plain, the others have certain figures, at preſent ſcarcely intelligible. Not far from theſe pillars is another called the *giant's thumb*, five feet eight inches high, with an expanded head, perforated on both ſides; from the middle the ſtone riſes again into a leſſer head, rounded at top; but no part has a tendency to the figure of a croſs, being in no part mutilated. The pillars are ſaid to have been ſet up in memory of Sir Owen Cæſarius, a famous warrior buried here, who killed ſo many wild bears, which much infeſted this county, that the figures of bears, cut out in ſtone, on each ſide of his grave, were ſet there in remembrance of the execution he made among thoſe beaſts; and it is likewiſe ſaid his body extended from one pillar to the other. In the market-place there is a town-houſe of wood, beautified with bears climbing up a ragged ſtaff. There is a memorandum on the north ſide of the veſtry without, that, in 1598, 2266 perſons died here of the plague. There is a charity ſchool in this place for 20 boys, and another for 30 girls, maintained by 55l. a-year, by the ſacrament-money and pariſh-ſtock. In 1715 the Scotch Highlanders entered this town, and quartered in it for a night, in their way to Preſton, without doing much harm; but in the laſt rebellion, in 1745, they were, it is ſaid, very rapacious and cruel. Its handſome ſpacious church has been lately rebuilt, and the roof ſupported by pillars, whoſe ſhafts are of one entire reddiſh ſtone, dug out of a neighbouring quarry. On the eaſt part of the pariſh, upon the north bank of the river Eamont, there are two caves or grottoes, dug out of the ſolid rock, and ſufficient to contain 100 men. The paſſage to them is very narrow and dangerous; and it is poſſible that its perilous acceſs may have given it the name of *Iſis Parlis;* though the vulgar tell ſtrange ſtories of one Iſis, a giant, who lived there in former times, and, like Cacus of old, uſed to ſeize men and cattle, and draw them into his den to devour them. But it is highly probable, that theſe ſubterraneous chambers were made for a ſecure retreat in time of ſudden danger; and the iron gates, which were taken away not long ago, ſeem to confirm that ſuppoſition. W. Long. 3. 16. N. Lat. 54. 35.

PENROSE, Thomas, was the ſon of the reverend Mr Penroſe, rector of Newbury, Berks, a man of high character and abilities, deſcended from an ancient Corniſh family, beloved and reſpected by all who knew him. Mr Penroſe, jun. being intended for the church, purſued his ſtudies with ſucceſs, at Chriſt-church, Oxon, until the ſummer of 1762, when his eager turn to the naval and military line overpowering his attachment to his real intereſt, he left his college, and embarked in the unfortunate expedition againſt Nova Colonia, in South America, under the command of Captain Macnamara. The iſſue was fatal. The Clive (the largeſt veſſel) was burnt; and though the Ambuſcade eſcaped (on board of which Mr Penroſe, acting as lieutenant of marines, was wounded), yet the hardſhips which he afterwards ſuſtained in a prize ſloop, in which he was ſtationed, utterly ruined his conſtitution. Returning to England with ample teſtimonials of his gallantry and good behaviour, he finiſhed, at Hertford College, Oxon, his courſe of ſtudies; and having taken orders, accepted the curacy of Newbury, the income of which, by the voluntary ſubſcription of the inhabitants, was conſiderably augmented. After he had continued in that ſtation about nine years, it ſeemed as if the clouds of diſappointment, which had hitherto overſhadowed his proſpects, and tinctured his poetical eſſays with gloom, were clearing away; for he was then preſented by a friend, who knew his worth and honoured his abilities, to a living worth near 500l. per annum. It came, however, too late; for the ſtate of Mr Penroſe's health was now ſuch as left little hope except in the aſſiſtance of the waters of Briſ-[illegible] he went; and there he died in 1779, aged 36 years. In 1768 he married Miſs Mary Slocock of Newbury, by whom he had one child, Thomas, who was educated at Winton College.

Mr Penroſe was reſpected for his extenſive erudition, admired for his eloquence, and equally beloved and eſteemed for his ſocial qualities. By the poor, towards whom he was liberal to his utmoſt ability, he was venerated to the higheſt degree. In oratory and compoſition his talents were great. His pencil was ready as his pen, and on ſubjects of humour had uncommon merit. To his poetical abilities the public, by their reception of his Flights of Fancy, &c. have given a favourable teſtimony.

PENRYN, a town of Cornwall, in England, ſeated on a hill at the entrance of Falmouth-haven by Pendennis caſtle. It conſiſts of about 300 houſes; and the ſtreets are broad and well paved. There are ſo many gardens and orchards in it, that it reſembles very much a town in a wood. It is well watered with rivulets, and has an arm of the ſea on each ſide of it, with a good cuſtomhouſe and quay, and other neat buildings. It drives a conſiderable trade in pilchards, and in the Newfoundland fiſhery. It was anciently governed by a portreeve; but James I. made it a corporation, conſiſting of a mayor, 11 aldermen, 12 common-council-men, with a recorder, ſteward, &c. an office of record every three weeks, with a priſon, and power to try felons in their juriſdiction. And he granted, that the mayor and two aldermen ſhould be juſtices of the peace, and that they ſhould have a guildhall. There was once a monaſtery in this place, which was a cell to Kirton; and there are ſtill to be ſeen a tower, and part of the garden walls, the ruins of a collegiate church. It has neither church nor chapel, but belongs to the pariſh of Gluvias, a quarter of a mile off. It has ſent members to parliament ever ſince the firſt year of Queen Mary; and James II. granted it a new charter, whereby their election was veſted in the magiſtracy only; but it was never made uſe of, all the inhabitants that pay ſcot and tot, who are not much above 100, being the electors. Mr Rymer gives a very remarkable account how Penryn was once ſaved by a company of ſtrolling players. He ſays, that towards the latter end of the 16th century the Spaniards were landing to burn the town juſt as the players were ſetting Samſon upon the Philiſtines; which performance was accompanied with ſuch drumming and ſhouting, that the Spaniards thought ſome ambuſh was laid for them, and ſcampered back to their ſhips. Queen Elizabeth founded a free-ſchool in this place. W. Long. 5. 35. N. Lat. 50. 23.

PENSACOLA, a ſettlement in North America, ſituated at the mouth of a river on the gulf of Mexico. It was eſtabliſhed by the French, and ceded to Great Britain in 1763. Its firſt diſcoverer was Sebaſtian Cabot in 1497.

The year 1781, ſo eventful to Britain in many reſpects, was alſo remarkable for the reduction of Penſacola by the Spaniards under Don Bernardo Galvez. Great preparations for this expedition had been making at the Havannah; but it was for ſome time retarded by a dreadful hurricane which attacked the Spaniſh fleet, and by which four ſhips of the line, beſides others of inferior note, were loſt, together with the people on board, to the amount of more than 2000. By this diſaſter the remainder were obliged to put back to the Havannah to repair;

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repair; but as ſoon as the fleet was again judged capable of putting to ſea, an embarkation was made of near 8000 men, with Don Bernardo at their head, together with five ſhips of the line, who arrived at Penſacola on the 9th of March 1781. This force was ſoon augmented by ten ſhips of the line and ſix frigates; while General Campbell, the Britiſh governor, could oppoſe ſuch a formidable armament with few more than 1000 men, conſiſting of ſome regulars and ſeamen, with the inhabitants. The entrance of the harbour, which was the principal object of defence, was guarded by two ſmall armed veſſels, but they were inſufficient to ſecond the batteries that had been erected for its protection; and theſe, without the aſſiſtance of ſome ſhips of force, were incapable of reſiſting a vigorous attack. Notwithſtanding this prodigious odds, however, the Spaniards met with the moſt determined oppoſition. Every inch of ground was diſputed with the greateſt reſolution. The harbour was not forced without the greateſt difficulty, nor could the veſſels be taken that defended it; the companies belonging to them, after ſetting them on fire, retired on ſhore.

The Spaniards, now in poſſeſſion of the harbour, inveſted the place in form, and made their approaches in a cautious and regular manner; while, on the other hand, the beſieged were no leſs active and vigilant in their own defence. Sallies were made occaſionally with great ſucceſs, at the ſame time that an uninterrupted fire was kept up in ſuch a manner as not only greatly to annoy, but even to ſtrike the beſiegers with aſtoniſhment. This incenſed the Spaniſh general the more, as he knew that the garriſon could expect no relief, and therefore that all their efforts could only prolong the date of their ſurrender. The reſiſtance was the more mortifying, as he was perfectly conſcious of the bravery of his troops; and he had artillery fit, as his officers expreſſed themſelves, "to be employed againſt Gibraltar." With all theſe advantages, however, ſo reſolute was the defence of the garriſon, that after the ſiege had continued for two months, very little hope could be entertained of its ſpeedy termination. As they deſpaired therefore of making any effectual impreſſion by means of their cannon, they erected a battery of mortars, with which they bombarded a redoubt that commanded the main avenue to the place; and in this they were favoured by an unexpected accident. On the 8th of May a ſhell burſt open the door of the powder magazine under the redoubt, by which it was blown up, with the loſs of near 100 men killed and wounded. Fortunately for the garriſon, however, two flank-works ſtill remained entire, from both which ſo heavy a fire was kept up, that though an aſſault was immediately given, the aſſailants were repulſed with great ſlaughter. This afforded leiſure to the garriſon to carry off the wounded men, with ſome of the artillery, and to ſpike up the reſt. As the enemy, however, ſoon recovered themſelves, and prepared for a general ſtorm, it was thought proper to abandon the flank-works, and retire into the body of the place. The poſſeſſion of theſe outworks, however, gave the enemy ſuch advantages, that the place was no longer tenable. Their ſituation, on a riſing ground, enabled them to command the battery oppoſite to their chief approach with ſmall arms, and to ſingle out the men at their guns. A capitulation therefore became abſolutely neceſſary, which was obtained on honourable terms. The town, with the whole province of Weſt Florida, was confirmed to the Spaniards by the treaty of 1783. W. Long. 87. 20. N. Lat. 30. 22.

Penſance, Penſilvania.

PENSANCE, a town of Cornwall, in England, at the bottom of Mountſbay, about ten miles from the Land's End. It was burnt in 1595 by the Spaniards, who, with four galleys, ſurpriſed this part of the coaſt, and ſet fire to ſeveral villages and farms: but it was ſoon after rebuilt, made one of the coinage towns, and has now a conſiderable trade. It lies in the pariſh of Madern, noted for its reſtorative ſpring, very effectual in the cure of lameneſs as well as the cholic, &c. It is well built and populous, and has many ſhips belonging to it. The ſhore abounds ſo with lead, tin, and copper ore, that the veins thereof appear on the utmoſt extent of land at low-water mark.

PENSILES HORTI, *Hanging Gardens*, in antiquity. See BABYLON, N° 5.

PENSILVANIA, late one of the principal Britiſh colonies in North America, had its name from the famous Quaker William Penn, ſon of Sir William, commander of the Engliſh fleet in Oliver Cromwell's time, and in the beginning of Charles II.'s reign, who obtained a grant of it in the year 1679; is bounded on the eaſt by Delaware bay and river, and the Atlantic ocean; on the north by the country of the Iroquois, or five nations; and on the ſouth and weſt by Maryland. Its extent from north to ſouth is about 200 miles; but its breadth varies greatly, from 15, and even leſs, to near 200.

The air in Penſilvania is ſweet and clear. The fall, or autumn, begins about the 20th of October, and laſts till the beginning of December, when the winter ſets in, which continues till March, and is ſometimes extremely cold and ſevere; but the air is then generally dry and healthy. The river Delaware, though very broad, is often frozen over. From March to June, that is, in the ſpring, the weather is more inconſtant than in the other ſeaſons. In the months of July, Auguſt, and September, the heats would be almoſt intolerable, if they were not mitigated by frequent cool breezes. The wind during the ſummer is generally ſouth-weſt; but in the winter blows for the moſt part from the north-weſt, over the ſnowy frozen mountains and lakes of Canada, which occaſions the exceſſive cold during that ſeaſon. On the whole, the climate of this ſtate differs not materially from that of Connecticut, except that on the weſt ſide of the mountains the weather is much more regular. The inhabitants never feel thoſe quick tranſitions from cold to heat, by a change of the wind from north to ſouth, as thoſe ſo frequently experience who live eaſtward of the mountains and near the ſea. The hot ſouthwardly winds get chilled by paſſing over the long chain of Allegany mountains.

Longevity, when tolerably aſcertained, is doubtleſs the trueſt mark of the healthineſs of any country; but this ſtate, which has not been ſettled above 100 years, is not ſufficiently old to determine from facts the ſtate of longevity. Among the people called Quakers, who are the oldeſt ſettlers; there are inſtances of longevity, occaſioned by their living in the old cultivated counties, and the temperance impoſed on them by their religion. There are fewer long-lived people among the Germans than among other nations, occaſioned by their exceſs of labour and low diet. They live chiefly upon vegetables

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and watery food, that affords too little nouriſhment to repair the waſte of their ſtrength by hard labour. Nearly one half of the children born in Philadelphia die under two years of age, and chiefly with a diſeaſe in the ſtomach and bowels. Very few die at this age in the country.

As to the face of this country, towards the coaſt, like the adjacent colonies, it is flat, but riſes gradually to the Apalachian mountains on the weſt. As much as nearly one third of this ſtate may be called mountainous; particularly the counties of Bedford, Huntingdon, Cumberland, part of Franklin, Dauphin, and part of Bucks and Northampton, through which paſs, under various names, the numerous ridges and ſpurs, which collectively form what we chooſe to call, for the ſake of clearneſs, *the great range of Allegany mountains.* There is a remarkable difference between the country on the eaſt and weſt ſide of the range of mountains we have juſt been deſcribing. Between theſe mountains and the lower falls of the rivers which run into the Atlantic, not only in this, but in all the ſouthern ſtates, are ſeveral ranges of ſtones, ſand, earths, and minerals, which lie in the utmoſt confuſion. Beds of ſtone, of vaſt extent, particularly of limeſtone, have their ſeveral layers broken in pieces, and the fragments thrown confuſedly in every direction. Between theſe lower falls and the ocean is a very extenſive collection of ſand, clay, mud, and ſhells, partly thrown up by the waves of the ſea, partly brought down by floods from the upper county, and partly produced by the decay of vegetable ſubſtances. The country weſtward of the Allegany mountains, in theſe reſpects, is totally different. It is very irregular, broken, and variegated, but there are no mountains; and when viewed from the moſt weſtern ridge of the Allegany, it appears to be a vaſt extended plain. All the various ſtrata of ſtone appear to have lain undiſturbed in the ſituation wherein they were firſt formed. The layers of clay, ſand, and coal, are nearly horizontal. Scarcely a ſingle inſtance is to be found to the contrary. Every appearance, in ſhort, tends to confirm the opinion, that the original cruſt, in which the ſtone was formed, has never been broken up on the weſt ſide of the mountains, as it evidently has been eaſtward of them.

The chief rivers are three, Delaware, Suſquehanna, and Skoolkil. The Delaware, riſing in the country of the Iroquois, takes its courſe ſouthward; and after dividing this province from that of New Jerſey, falls into the Atlantic ocean between the promontories or capes May and Henlopen, forming at its mouth a large bay, called from the river *Delaware Bay.* This river is navigable above 200 miles. The Suſquehanna riſes alſo in the country of the Iroquois, and running ſouth through the middle of the province, falls into the bay of Cheſapeake, being navigable a great way for large ſhips. The Skoolkil has its ſource in the ſame country as the other two, and alſo runs ſouth, almoſt parallel to them; till at length, turning to the eaſtward, it falls into the Delaware at the city of Philadelphia. It is navigable for boats above 100 miles. Theſe rivers, with the numerous creeks and harbours in Delaware bay, capable of containing the largeſt fleets, are extremely favourable to the trade of this province.

As to the ſoil, produce, and traffic of Penſilvania, we refer the reader to the articles NEW-YORK and the

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JERSEYS, ſince what is there ſaid on thoſe heads is equally applicable to this province; and if there is any difference, it is on the ſide of this province. They have ſome rice here, but in no great quantities; and ſome tobacco, but it is not equal to that of Virginia. From the premiums offered by the ſociety of arts in London, it appears that the ſoil and climate of this province are looked upon as proper for the cultivation of ſome ſpecies of vines. The trade carried on from hence and the other colonies to the French and Dutch iſlands and Surinam, was greatly to the diſadvantage of Britain, and very deſtructive to the ſugar-colonies: for they take molaſſes, rum, and other ſpirits, with a great many European goods, from theſe foreigners; carrying them horſes, proviſions, and lumber in return; without which the French could not carry on their ſugar-manufactures to that advantage they do.

New York, the Jerſeys, and Penſilvania, were diſcovered, with the reſt of the continent of North America, in the reign of Henry VII. by Sebaſtian Cabot, for the crown of England; but Sir Walter Raleigh was the firſt adventurer that attempted to plant colonies on theſe ſhores, in the reign of Queen Elizabeth; and, in honour of that princeſs, gave all the eaſtern coaſt of North America the name of *Virginia.* Mr Hudſon, an Engliſhman, ſailing to that part of the coaſt which lies between Virginia and New England, in the beginning of the reign of James I. and being about to make a ſettlement at the mouth of Hudſon's river, the Dutch gave him a ſum of money to diſpoſe of his intereſt in this country to them. In the year 1608 they began to plant it; and, by virtue of this purchaſe, laid claim to all thoſe countries which are now denominated *New York, New Jerſey,* and *Penſilvania*; but there remaining ſome part of this coaſt which was not planted by the Hollanders, the Swedes ſent a fleet of ſhips thither, and took poſſeſſion of it for that crown; but the Dutch having a ſuperior force in the neighbourhood, compelled the Swedes to ſubmit to their dominion, allowing them, however, to enjoy the plantations they had ſettled. The Engliſh not admitting that either the Dutch or Swedes had any right to countries firſt diſcovered and planted by a ſubject of England, and part of them at that time poſſeſſed by the ſubjects of Great Britain, under charter from Queen Elizabeth and King James I.; King Charles II. during the firſt Dutch war in 1664, granted the countries of New York, the Jerſeys, and Penſilvania, of which the Dutch had uſurped the poſſeſſion, to his brother James duke of York; and Sir Robert Carr being ſent over with a ſquadron of men of war and land forces, and ſummoning the Dutch governor of the city of New Amſterdam, now New York, to ſurrender, he thought fit to obey the ſummons, and yield that capital to the Engliſh: the reſt of the places in the poſſeſſion of the Dutch and Swedes followed his example; and theſe countries were confirmed to the Engliſh by the Dutch at the next treaty of peace between the two nations. The duke of York afterwards parcelled them out to under proprietors; ſelling, in particular, to William Penn the elder, in 1683, the town of Newcaſtle, *alias* Delaware, and a diſtrict of 12 miles round the ſame; to whom, his heirs and aſſigns, by another deed of the ſame date, he made over all that tract of land from 12 miles ſouth of Newcaſtle to the Whore-kills, otherwiſe called *Cape Henlopen,* now divided into the two nſilvania

counties of Kent and Suſſex, which, with Newcaſtle diſtrict, are commonly known by the name of the *Three Lower Counties upon Delaware River*. All the reſt of the under-proprietors, ſome time after, ſurrendered their charters to the crown; whereby New York and the Jerſeys became royal governments; but Penn retained that part of the country which had been ſold to him by the duke of York, together with what had been granted to him before in 1680-1, which now conſtitutes the province of Penſilvania. As ſoon as Penn had got his patent, he began to plant the country. Thoſe who went over from England were generally Diſſenters and Quakers, whoſe religion is eſtabliſhed by law here, but with a toleration of all other Proteſtant ſects. The Dutch and Swedes, who were ſettled here before Mr Penn became proprietor, chooſing ſtill to reſide in this country, as they did in New York and the Jerſeys, obtained the ſame privileges as the reſt of his majeſty's ſubjects; and their deſcendants are now in a manner the ſame people with the Engliſh, ſpeaking their language, and being governed by their laws and cuſtoms. Mr Penn, however, not ſatisfied with the title granted him by King Charles II. and his brother, bought the lands alſo of the Indians for a valuable conſideration, or what they eſteemed ſuch (though 20 miles were purchaſed, at firſt, for leſs than an acre about Philadelphia would pay now), paying them in cloth, tools, and utenſils, to their entire ſatisfaction; for they had not hands to cultivate the hundredth part of their lands, and if they could have raiſed a product, there was nobody to buy: the purchaſe, therefore, was all clear gain to them; and, by the coming of the Engliſh, their paltry trade became ſo profitable, that they ſoon found their condition much altered for the better; and are now as well clothed and fed as the European peaſantry in many places.

Penſilvania is one of the moſt flouriſhing colonies in North America, having never had any quarrel with the natives. Whenever they deſire to extend their ſettlements, they purchaſe new lands of the ſachems, never taking any by force; but the Indians now ſet a very high price upon their lands, in compariſon of what they did at firſt, and will hardly part with them at any rate. In an eſtimate of the proprietary eſtate of the province, publiſhed above 40 years ago, we find, that the proprietaries, who alone can purchaſe lands here from the natives, had bought ſeven millions of acres for no more than 750l. ſterling, which the proprietaries afterwards ſold at the rate of 15l. for every 100 acres. The Indian council at Onandago, however, diſapproved of their deputies parting with ſo much land; and, in the year 1755, obliged the proprietaries to reconvey great part of the ſame to the Indians.

A diſpute ſubſiſted a long time between the proprietaries of this province and Lord Baltimore, proprietary of Maryland, about the right to certain lands; which was at laſt amicably adjuſted, though greatly in favour of the Penns.

About the year 1704 there happened ſome alteration in the conſtitution of the province. The eſtabliſhment that took place, and ſubſiſted till the American war broke out, conſiſted of a governor, council, and aſſembly, each with much the ſame power and privileges as in the neighbouring colony of New York. The lieutenant-governor and council were appointed by the proprietors Thomas and Richard Penn, with his majeſty's approbation; but if the laws enacted here were not repealed within ſix months after they had been preſented to the king for his approbation or diſallowance, they were not repealable by the crown after that time.

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By the preſent conſtitution of Penſilvania, which was eſtabliſhed in September 1776, all legiſlative powers are lodged in a ſingle body of men, which is ſtyled, *The general aſſembly of repreſentatives of the freemen of Penſilvania.* The qualification required to render a perſon eligible to this aſſembly is, two years reſidence in the city or county for which he is choſen. The qualifications of the electors are, full age, and one year's reſidence in the ſtate, with payment of public taxes during that time. But the ſons of freeholders are intitled to vote for repreſentatives, without any qualification except full age. No man can be elected as a member of the aſſembly more than four years in ſeven. The repreſentatives are choſen annually on the ſecond Tueſday in October, and they meet on the fourth Monday of the ſame month. The ſupreme executive power is lodged in a preſident, and a council conſiſting of a member from each county. The preſident is elected annually by the joint ballot of the aſſembly and council, and from the members of council. A vice-preſident is choſen at the ſame time. The counſellors are choſen by the freemen every third year; and having ſerved three years, they are ineligible for the four ſucceeding years. The appointments of one-third only of the members expire every year; by which rotation no more than one-third can be new members.

Manufactures of different kinds are numerous in this ſtate, and rapidly on the increaſe. There are 16 furnaces and 37 forges, the latter of which it is ſuppoſed, will prepare annually 6290 tons of iron. Here alſo they make every implement of huſbandry and kitchen utenſils. Penſilvania contains 52 mills for the manufacturing of paper, the annual product of which has been valued at 25,000 dollars About 300,000 hats of wool and fur are annually made; and the mills for making gunpowder are 25 in number. Glauber's ſalts and ſal ammoniac have alſo begun to be manufactured of late to a conſiderable extent; and there are water-works near the falls of Trenton which grind grain, roll and ſlit iron, and pound gypſum or plaſter of Paris. The number of militia is eſtimated at upwards of 90,000. For people of almoſt every religious perſuaſion there are about 384 places of public worſhip. The expence of the government of this ſtate amounts to about 32,280l. ſterling annually.

With reſpect to population, Morſe informs us, that in 1787 the inhabitants in Penſilvania were reckoned at 360,000. It is probable they are now more numerous, perhaps 400,000. If we fix them at this, the population for every ſquare mile will be only nine; by which it appears that Penſilvania is only one-fifth as populous as Connecticut. But Connecticut was ſettled nearly half a century before Penſilvania; ſo that in order to do juſtice to Penſilvania in the compariſon, we muſt anticipate her probable population 50 years hence. By a cenſus taken in 1790, the population amounted to 431,000. Theſe inhabitants conſiſt of emigrants from England, Ireland, Germany, and Scotland. The Friends and Epiſcopalians are chiefly of Engliſh extraction, and compoſe about one third of the inhabitants. They live

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principally in the city of Philadelphia, and in the counties of Cheſter, Philadelphia, Bucks, and Montgomery. The Iriſh are moſtly Preſbyterians. Their anceſtors came from the north of Ireland, which was originally ſettled from Scotland; hence they have been ſometimes called Scotch Iriſh, to denote their double deſcent. But they are commonly and more properly called Iriſh, or the deſcendants of people from the north of Ireland. They inhabit the weſtern and frontier counties, and are numerous. The Germans compoſe one quarter at leaſt, if not a third, of the inhabitants of Penſilvania. They inhabit the north parts of the city of Philadelphia, and the counties of Philadelphia, Montgomery, Bucks, Dauphin, Lancaſter, York, and Northampton; moſtly in the four laſt. They conſiſt of Lutherans (who are the moſt numerous ſect), Calviniſts, Moravians, Mennoniſts, Tunkers (corruptly called Dunkers), and Swingfelters, who are a ſpecies of Quakers. Theſe are all diſtinguiſhed for their temperance, induſtry, and economy. The Germans have uſually 15 of 69 members in the aſſembly; and ſome of them have ariſen to the firſt honours in the ſtate, and now fill a number of the higher offices. Yet the lower claſs are very ignorant and ſuperſtitious. It is not uncommon to ſee them going to market with a little bag of ſalt tied to their horſes manes, for the purpoſe, they ſay, of keeping off the witches.

The Baptiſts (except the Mennoniſt and Tunker Baptiſts, who are Germans) are chiefly the deſcendants of emigrants from Wales, and are not numerous. A proportionate aſſemblage of the national prejudices, the manners, cuſtoms, religions, and political ſentiments of all theſe, will form the Penſilvania character. As the leading traits in this character, thus conſtituted, we may venture to mention induſtry, frugality bordering in ſome inſtances on parſimony, enterpriſe, a taſte and ability for improvements in mechanics, in manufactures, in agriculture, in commerce, and in the liberal ſciences; temperance, plainneſs, and ſimplicity in dreſs and manners; pride and humility in their extremes; inoffenſiveneſs and intrigue; in regard to religion, variety and harmony; liberality, and its oppoſites, ſuperſtition and bigotry; and in politics an unhappy jargon. Such appear to be the diſtinguiſhing traits in the collective Penſilvanian character.

Of the great variety of religious denominations in Penſilvania, the Friends or Quakers are the moſt numerous. They were the firſt ſettlers of Penſilvania in 1682 under William Penn, and have ever ſince flouriſhed in the free enjoyment of their religion. They neither give titles nor uſe compliments in their converſation or writings, believing that *whatſoever is more than yea, yea, and nay, nay, cometh of evil.* They conſcientiouſly avoid, as unlawful, kneeling, bowing, or uncovering the head to any perſon. They diſcard all ſuperfluities in dreſs or equipage; all games, ſports, and plays, as unbecoming the Chriſtian. *Swear not at all*, is an article of their creed literally obſerved in its utmoſt extent. They believe it unlawful to fight in any caſe whatever; and think that if their enemy *ſmite them on the one cheek, they ought to turn to him the other alſo.* They are generally honeſt, punctual, and even punctilious in their dealings; provident for the neceſſities of their poor; friends to humanity, and of courſe enemies to ſlavery; ſtrict in their diſcipline; careful in the obſervance even of the punctilios in dreſs, ſpeech, and manners, which their religion enjoins; faithful in the education of their children; induſtrious in their ſeveral occupations. In ſhort, whatever peculiarities and miſtakes thoſe of other denominations have ſuppoſed they have fallen into, in point of religious doctrines, they have proved themſelves to be good citizens. Next to the Quakers, the Preſbyterians are the moſt numerous. There are upwards of 60 miniſters of the Lutheran and Calviniſt religion, who are of German extraction, now in this ſtate; all of whom have one or more congregations under their care; and many of them preach in ſplendid and expenſive churches; and yet the firſt Lutheran miniſter, who arrived in Penſilvania about 40 years ago, was alive in 1787, and probably is ſtill, as was alſo the ſecond Calviniſtical miniſter. The Lutherans do not differ in any thing eſſential from the Epiſcopalians, nor do the Calviniſts from the Preſbyterians.

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The Moravians are of German extraction. Of this religion there are about 1300 ſouls in Penſilvania, viz. between 500 and 600 in Bethlehem, 450 in Nazareth, and upwards of 300 at Litiz in Lancaſter county. They call themſelves the *United Brethren of the Proteſtant Epiſcopal Church.* They are called *Moravians*, becauſe the firſt ſettlers in the Engliſh dominions were chiefly migrants from Moravia. See HERNHUTTERS, and UNITAS *Fratrum;* and for the Mennonites, ſee MENNONITES. They were introduced into America by Count Zinzendorff, and ſettled at Bethlehem, which is their principal ſettlement in America, as early as 1741. For the Tunkers, ſee TUNKERS.

There are a great many literary, humane, and other uſeful ſocieties in Penſilvania; more, it is ſaid, than in any of the United Provinces. There are ſeveral univerſities and colleges at Philadelphia and other places: See PHILADELPHIA. Lancaſter, Carliſle, and Pittſburgh, are the chief towns after Philadelphia.

Penſilvania is divided into ſeven counties; four of which are called the *Upper*, and three the *Lower.* Of the upper, viz. Buckingham, Philadelphia, Cheſter, and Lancaſter, the three firſt are the lands included in King Charles II.'s grant, and deſigned *Penſilvania;* the lower, viz. thoſe of Newcaſtle, Kent, and Suſſex, were called *Nova Belgia* before the duke of York ſold them, as we obſerved above, to Mr Penn. The upper counties end at Marcus Hook, four miles below Cheſter town, where the lower begin, and run along the coaſt near 100 miles. Each of theſe counties had a ſheriff, with a quarterly and monthly ſeſſion, and aſſizes twice a year.

In the Philoſophical Tranſactions for 1757, there is an account of a ſpring in Penſilvania, which riſes from a copper mine, and yields 800 hogſheads in twenty-four hours. The water is of a pale green colour, of an acid, ſweet, auſtere, inky, and nauſeous taſte. The ſaline matter which it holds in ſolution is probably ſulphate of copper; for a piece of poliſhed iron immerſed in it is ſoon covered with a cruſt of metallic copper. It contains alſo, it is ſaid, copperas or ſulphate of iron.

Among the other curioſities of this province may be reckoned another ſpring, about 14 feet deep, and about 100 ſquare in the neighbourhood of Reading. A full

mill

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mill ſtream flows from it. The waters are clear, and full of fiſhes. From appearances it is probable that this ſpring is the opening or outlet of a very conſiderable river, which, a mile and a half or two miles above this place, ſinks into the earth, and is conveyed to this outlet in a ſubterranean channel. In the northern parts of Penſilvania there is a creek, called *Oil creek*, which empties into the Alleghany river. It iſſues from a ſpring, on the top of which floats an oil ſimilar to that called Barbadoes tar, and from which one man may gather ſeveral gallons in a day. The troops ſent to guard the weſtern poſts halted at this ſpring, collected ſome of the oil, and bathed their joints with it. This gave them great relief from the rheumatic complaints with which they were affected. The waters, of which the troops drank freely, operated as a gentle purge.

There are three remarkable grottoes or caves in this ſtate; one near Carliſle in Cumberland county; one in the townſhip of Durham, in Bucks county; and the other at Swetara in Lancaſter county. Of the two former there are no particular deſcriptions. The latter is on the eaſt bank of Swetara river, about two miles above its confluence with the Suſquehannah. Its entrance is ſpacious, and deſcends ſo much as that the ſurface of the river is rather higher than the bottom of the cave. The vault of this cave is of a ſolid limeſtone rock, perhaps 20 feet thick. It contains ſeveral apartments, ſome of them very high and ſpacious. The water is inceſſantly percolating through the roof, and falls in drops to the bottom of the cave. Theſe drops petrify as they fall, and have gradually formed ſolid pillars, which appear as ſupports to the roof. Thirty years ago there were ten ſuch pillars, each ſix inches in diameter, and ſix feet high; all ſo ranged that the place they encloſed reſembled a ſanctuary in a Roman church. No royal throne ever exhibited more grandeur than this *luſus naturæ*. The reſemblances of ſeveral monuments are found indented in the walls on the ſides of the cave, which appear like the tombs of departed heroes. Suſpended from the roof is *the bell* (which is nothing more than a ſtone projected in an unuſual form), ſo called from the ſound that it occaſions when ſtruck, which is ſimilar to that of a bell. Some of the ſtalactites are of a colour like ſugar-candy, and others reſemble loaf ſugar; but their beauty is much defaced by the country people. The water, which percolates through the roof, ſo much of it as is not petrified in its courſe, runs down the declivity, and is both pleaſant and wholeſome to drink. There are ſeveral holes in the bottom of the cave, deſcending perpendicularly, perhaps into an abyſs below, which renders it dangerous to walk without a light. At the end of the cave is a pretty brook, which, after a ſhort courſe loſes itſelf among the rocks. Beyond this brook is an outlet from the cave by a very narrow aperture. Through this the vapours continually paſs outwards with a ſtrong current of air, and aſcend, reſembling at night the ſmoke of a furnace. Part of theſe vapours and fogs appear on aſcending to be condenſed at the head of this great alembic, and the more volatile parts to be carried off, through the aperture communicating with the exterior air before mentioned, by the force of the air in its paſſage.

PENSION, a ſum of money paid annually for ſervices or conſiderations already paſt. The yearly payment of each member to the houſes of the inns of courts are likewiſe named *penſions*; and the yearly aſſembly of the ſociety of Gray's Inn, to conſult on the affairs of the houſe, is alſo called a *penſion*.

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PENSIONARY, or **Penſioner**, a perſon who has an appointment or yearly ſum, payable during life, by way of acknowledgement, charged on the eſtate of a prince, company, or particular perſon.

Grand **PENSIONARY**, an appellation formerly given to the firſt miniſter of the ſtates of Holland. The grand penſionary was chairman in the aſſemblies of the ſtates of that province; he propoſed the matters to be conſulted on; collected the votes; formed and pronounced the reſolutions of the ſtates; opened letters; conferred with foreign miniſters, &c. His buſineſs was alſo to inſpect the finances, to maintain the authority of the ſtates, and to ſee that the laws were obſerved; and he was perpetual deputy of the ſtates general of the United Provinces. His commiſſion was, however, only given him for five years; after which it was deliberated whether or not it ſhould be renewed; but there was no inſtance of its being revoked; therefore death only put an end to the functions of this important miniſter.

Penſionary was alſo the firſt miniſter of the regency of each city in Holland. His office was to give his advice in affairs relating to the government, either of the ſtate in general, or of the city in particular; and in aſſemblies of the ſtates of the province, he was ſpeaker in behalf of his city. The function, however, of theſe penſionaries was not everywhere alike; in ſome cities they only gave their advice, and were never found in aſſemblies of the magiſtrates, except when expreſsly called hither: in others they attended conſtantly; and in others they made the propoſitions on the part of the burgomaſters, drew up their concluſions, &c. They were called *penſionaries*, becauſe they received an appointment or penſion.

PENSIONER, in general, denotes a perſon who receives a penſion, yearly ſalary, or allowance. Hence,

The Band of Gentlemen **Penſioners**, the nobleſt ſort of guard to the king's perſon, conſiſts of 40 gentlemen, who receive a yearly penſion of 100l.

This honourable band was firſt inſtituted by King Henry VIII. and their office is to attend the king's perſon, with their battle-axes, to and from his chapel royal, and to receive him in the preſence chamber, or coming out of his privy lodgings; they are alſo to attend at all great ſolemnities, as coronations, St George's feaſt, public audiences of ambaſſadors, at the ſovereign's going to parliament, &c.

They are each obliged to keep three double horſes and a ſervant, and ſo are properly a troop of horſe. They wait half at a time quarterly; but on Chriſtmas-day, Eaſter-day, Whitſunday, &c. and on extraordinary occaſions, they are all obliged to give their attendance. They have likewiſe the honour to carry up the ſovereign's dinner on the coronation-day and St George's feaſt; at which times the king or queen uſually confer the honour of knighthood on two ſuch gentlemen of the band as their captain preſents.

Their arms are gilt battle-axes; and their weapons, on horſeback, in time of war, are cuiraſſiers arms, with ſword and piſtols. Their ſtandard in time of war is, argent, a croſs gules. Their captain is always a nobleman, who has under him a lieutenant, a ſtandard-bearer, a clerk of the check, ſecretary, paymaſter, and harbinger.

Pensioner, in the univerſity of Cambridge and in that of Dublin, has a very peculiar meaning: for thoſe ſtudents, either under graduates or bachelors of arts, are called *penſioners* who live wholly at their own expence, and who receive no emolument whatever from the college of which they are members. They are divided into two kinds, the *greater* and the *leſs*; the former of which are generally called *fellow-commoners*, becauſe they eat with the fellows of their college; the latter are always called *penſioners*, and eat with the ſcholars, who are thoſe ſtudents of the college, either under-graduates or bachelors who are upon the foundation, who receive emoluments from the ſociety, and who are capable of being elected fellows. See Servitor and Sizar.

PENSTOCK, a ſluice or flood-gate, ſerving to retain or let go at pleaſure the water of a mill-pond, or the like.

PENTACHORD (compounded of πεντε *five*, and χορδη *ſtring*), an ancient muſical inſtrument with five ſtrings. The invention of the pentachord is referred to the Scythians; the ſtrings were of bullocks leather, and they were ſtruck with a plectrum made of goats horn.

PENTACROSTIC, in *Poetry*, a ſet of verſes ſo diſpoſed, as that there are always five acroſtics of the ſame name, in five diviſions of each verſe. See Acrostic.

PENTADACTYLON, five fingers, in *Botany*, a name given by ſome authors to the *ricinus* or *palma Chriſti*, from the figure of its leaf.

PENTADACTYLOS piscis, the *five fingered fiſh*, the trivial name of a fiſh common in all the ſeas of the Eaſt Indies, and called by the Dutch there *viif vinger viſch*.

PENTAGON, in *Geometry*, a figure of five ſides and five angles. See Geometry.

In fortification, pentagon denotes a fort with five baſtions.

PENTAGRAPH, Pantograph, or Pantographer, an inſtrument deſigned for drawing figures in what proportion you pleaſe, without any ſkill in the art.

The inſtrument is otherwiſe called a *parallelogram*. The following is the deſcription of this inſtrument by Mr Adams.

Geomet. and *Graphic Eſſays*, p. 374.

"It is an inſtrument (ſays Mr Adams) as uſeful to the experienced draftſman, as to thoſe who have made but little progreſs in the art. It ſaves a great deal of time, either in reducing, enlarging, or copying of the ſame ſize, giving the outlines of any drawing, however crooked or complex, with the utmoſt exactneſs; nor is it confined to any particular kind, but may with equal facility be uſed for copying figures, plans, ſea-charts, maps, profiles, landſcapes, &c.

"*Deſcription and uſe of the Pantographer.*—I have not been able to aſcertain who was the inventor of this uſeful inſtrument. The earlieſt account I find is that of the Jeſuit Scheiner, about the year 1631, in a ſmall tract entitled *Pantographice, ſive ars nova delineandi.* The principles are ſelf-evident to every geometrician; the mechanical conſtruction was firſt improved and brought to its preſent ſtate of perfection by *my father*, about the year 1750. It is one, among many other ſcientific improvements and inventions completed by him, that others have ingloriouſly, and many years after, aſſumed to themſelves.

"The pantographer is uſually made of wood, or braſs, and conſiſts of four flat rules, two of them long, and two ſhort. The two longeſt are joined at the end A, by a double pivot, which is fixed to one of the rules, and works in two ſmall holes placed at the end of the other. Under the joint is an ivory caſtor, to ſupport this end of the inſtrument. The two ſmaller rules are fixed by pivots at E and H, near the middle of the larger rules, and are alſo joined together at their other end, G.

Plate CCCCIX.

By the conſtruction of this inſtrument, the four rules always form a parallelogram. There is a ſliding box on the longer arm, and another on the ſhorter arm. Theſe boxes may be fixed at any part of the rules by means of their milled nuts; each of theſe boxes is furniſhed with a cylindric tube, to carry either the tracing point or crayon or fulcrum.

The fulcrum or ſupport K, is a leaden weight incloſed in a mahogany box, on this the inſtrument moves when in uſe; there are two moveable rollers, to ſupport and facilitate the motions of the pantographer, their ſituation may be varied as occaſion requires.

The graduations are placed on two of the rules, on each of them are two ſcales, the fiducial edges of the boxes are to be ſet to theſe, according to the work to be performed by the inſtrument.

"The crayon, the tracer, and fulcrum, muſt in all caſes be in a right line, ſo that when they are ſet, if a ſtring be ſtretched over them, and they do not coincide with it, there is an error either in the ſetting or graduations.

"The long tube which carries the pencil or crayon, moves eaſily up or down another tube; there is a ſtring affixed to the long or inner tube, paſſing afterwards through the holes in the three ſmall knobs to the tracing point, where it may, if neceſſary, be faſtened. By pulling this ſtring, the pencil is lifted up occaſionally, and thus prevented from making falſe or improper marks upon the copy.

"*To uſe this inſtrument when the copy is to be of the ſame ſize as the original.*—Place the inſtrument upon a large table, and ſet the ſliding boxes B and D, to the diviſions marked 12. Put the crayon into the box B, place the box D upon the fulcrum or leaden foot; the tracing point at C. Then lay a piece of paper under the crayon, and the original drawing under the tracer, and move the tracing point over the principal ſtrokes of the original, and the crayon will form the required copy.

"*To reduce a drawing, &c. to half the ſize of the original.*—Set the boxes B and D, to the diviſions marked one-half, place the fulcrum at B, the crayon at D, and the tracer at C.

"*To reduce a drawing, &c. to leſs than one-half the original.*—Suppoſe one-third, one-fourth, one fifth, &c. Place the fulcrum at B, crayon at D, and tracer at C, and ſlide the boxes B and D, to the diviſions marked one-third, one-fourth, one-fifth, &c. *on the longer ſcales.* It may be proper to obſerve here, that if the copy be leſs than one-half the original, or when it is required greater than the original, the longer ſcales are to be uſed.

"*For greater than one-half the original drawing.*—Suppoſe it be required to make a drawing, two-thirds, three-fourths, four-fifths, &c. Set the boxes B and D, to correſponding diviſions, as two-thirds, three fourths, four-fifths, &c. *on the ſhorter ſcales*, place the fulcrum at D, the crayon at B, and tracer at C.

"*When the original drawing is to be enlarged.*—Suppoſe one-eighth, one-ſixth, &c. ſet the boxes B and D, to one-eighth, one-ſixth, &c. *on the longer ſcales*, place the fulcrum at D, the crayon at C, and tracer at B.

"*Where the copy is required of a ſize differing from the fractional parts laid down on the inſtrument.*—For this purpoſe there are two ſcales laid down, containing 100 unequal parts, one ſcale numbered from 10 to 80, the other from 50 to 100.

"*If the copy is to be under one half the original ſize*, place the boxes B and D, to any two correſponding diviſions under 50, the fulcrum at B, and crayon at D.

"*If the copy is to be larger than one-half the original*, place the boxes B and D, to correſponding diviſions between 50 and 100; the fulcrum at B, and crayon at D.

"*To change the ſituation of the pantographer.*—Copy firſt as much as the pantographer will take in; then make three points on the original, and as many correſponding points on the copy. Then remove the fulcrum to another ſituation, but ſo, that when the tracing point is applied to the three points marked on the original, the crayon may exactly coincide with the other three points on the copy, and proceed as before; and ſo on for every change in the ſituation of your inſtrument, and by this means a pantographer of two feet and a half in length will copy a drawing of any ſize whatſoever.

PENTAMETER, in ancient poetry, a kind of verſe, conſiſting of five feet, or metres, whence the name. The two firſt feet may be either dactyls or ſpondees at pleaſure; the third is always a ſpondee; and the two laſt anapeſtes: ſuch is the following verſe of Ovid.

1 2 3 4 5
Carmini bus vi|ves tem|pus in om|ne meis.

A pentameter verſe ſubjoined to an hexameter, conſtitutes what is called *elegiac*. See Elegiac.

PENTANDRIA (from πεντε *five*, and ανηρ *a man or huſband)*; the name of the fifth claſs in Linnæus's ſexual method, conſiſting of plants which have hermaphrodite flowers, with five ſtamina or male organs. See Botany *Index*.

PENTAPETALOUS, an appellation given to flowers which conſiſt of five petals or leaves.

PENTAPETES, a genus of plants belonging to the monadelphia claſs, and in the natural method ranking under the 37th order, *Columniferæ*. See Botany *Index*.

PENTAPOLIS. This name is given to the five cities, Sodom, Gomorrah, Adamah, Zeboim, and Zoar (Wiſdom x. 6.). They were all five condemned to utter deſtruction, but Lot interceded for the preſervation of Zoar, otherwiſe called *Bala*. Sodom, Gomorrah, Adamah, and Zeboim, were all conſumed by fire from heaven, and in the place where they ſtood was made the lake Aſphaltites, or the lake of Sodom.

Pentapolis (Ptolemy), a diſtrict of Cyrenaica; ſituated on the Mediterranean; denominated from its five cities; namely, Berenice, Arſinoe, Ptolemais, Cyrene, and Apollonia.

Pentapolis of the Philiſtines, (Joſephus); taking name from five principal cities, Gaza, Gath, Aſcalon, Azotus, and Ekron.

PENTATEUCH. This word, which is derived from the Greek Πεντατευχος, from πεντε *five*, and τευχος an *inſtrument or volume*, ſignifies the collection of the five inſtruments or books of Moſes, which are Geneſis, Exodus, Leviticus, Numbers, and Deuteronomy: each of which books we have given an account of under their ſeveral names.

There are ſome modern critics who have diſputed Moſes's right to the pentateuch. The obſerve that the author ſpeaks always in the third perſon. "Now the man Moſes was very meek above all the men which were upon the face of the earth. The Lord ſpake unto Moſes, ſaying, &c. Moſes ſaid to Pharaoh, &c." Thus they think he would never have ſpoken of himſelf; but would at leaſt ſometimes have mentioned himſelf in the firſt perſon. Beſides this, ſay they, the author of the pentateuch ſometimes abridges his narration like a writer who collected from ſome ancient memoirs. Sometimes he interrupts the thread of his diſcourſe; for example, he makes Lamech the bigamiſt ſay (Gen. iv. 23.), "Hear my voice, ye wives of Lamech, hearken unto my ſpeech; for I have ſlain a man to my wounding, and a young man to my hurt," without informing us before-hand to whom this is related. Theſe obſervations, for example (Gen. xii. 6.), "And the Canaanite was then in the land," cannot be reconciled to the age of Moſes, ſince the Canaanites continued to be the maſters of Paleſtine all the time of Moſes. The paſſage out of the book of the wars of the Lord, quoted in the book of Numbers (xxi. 14.), ſeems to have been clapped in afterwards, as alſo the firſt verſes of Deuteronomy. The account of the death of Moſes, which is at the end of the ſame book, cannot certainly belong to this legiſlator; and the ſame judgement may be made of other paſſages, wherein it is ſaid, that the places mentioned lay beyond Jordan; that the bed of Og was at Ramah to this day; that the havoth of Jair, or the cities of Jair, were known to the author, though probably they had not that name till after Moſes's time (Numb. xxxii. 41. Deut. iii. 14.).

It is obſerved alſo in the text of the Pentateuch, that there are ſome places that are defective; for example, in Exodus (xii. 8.), we ſee Moſes ſpeaking to Pharaoh, where the author omits the beginning of his diſcourſe. The Samaritan inſerts in the ſame place what is wanting in the Hebrew. In other places, the ſame Samaritan copy adds what is deficient in the Hebrew text; and what it contains more than the Hebrew ſeems ſo well connected with the reſt of the diſcourſe, that it would be difficult to ſeparate them. Laſtly, they believe that they obſerve certain ſtrokes in the pentateuch which can hardly agree with Moſes, who was born and bred in Egypt; as what he ſays of the earthly paradiſe, of the rivers that watered it, and ran through it; of the cities of Babylon, Erech, Reſen, and Calneh; of the gold of Piſon, of the bdellium, of the ſtone of Sohem, or onyx-ſtone, which was to be found in that country. Theſe particulars, obſerved with ſuch curioſity, ſeem to prove, that the author of the pentateuch lived beyond the Euphrates. Add what he ſays concerning the ark of Noah, of its conſtruction, of the place where it reſted, of the wood wherewith it was built, of the bitumen of Babylon, &c. But in anſwer to all theſe objections, we may obſerve in general, from an eminent writer * of our own country, that theſe books are by the moſt ancient writers aſcribed to Moſes; and it is confirmed by the authority of heathen writers themſelves, that they are of his writing: beſides this, we have the unanimous teſtimony of the whole Jewiſh nation, ever ſince Moſes's time, from the firſt writing of them. Divers texts of the pentateuch imply that it was written by Moſes; and the book of Joſhua, and other parts of ſcripture, import as much; and though ſome paſſages have been thought to imply the contrary, yet this is but a late opinion, and has been ſufficiently confuted by ſeveral learned men. The Samaritans receive no other ſcriptures but the pentateuch, rejecting all the other books which are ſtill in the Jewiſh canon.

* *Jenkin's Reaſonableneſs of Chriſtianity.*

PENTATHLON, in antiquity, a general name for the five exerciſes performed at the Grecian games, viz. wreſtling, boxing, leaping, running, and playing at the diſcus.

PENTECOST, a ſolemn feſtival of the Jews; ſo called, becauſe it was celebrated on the 50th day after the 16th of Niſan, which was the ſecond day of the paſſover. The Hebrews called it *the feaſt of weeks*, becauſe it was kept ſeven weeks after the paſſover. They then offered the firſt fruits of the wheat harveſt, which was then completed: beſides which they preſented at the temple ſeven lambs of that year, one calf, and two rams, for a burnt offering; two lambs for a peace offering; and a goat for a ſin offering (Levit. xxiii. 15, 16. Exod. xxxiv. 22. and Deut. xvi. 9, 10.). The feaſt of the pentecoſt was inſtituted among the Iſraelites, firſt to oblige them to repair to the temple of the Lord, there to acknowledge his abſolute dominion over the whole country, and to offer him the firſt-fruits of their harveſt; and, ſecondly, that they might call to mind, and give thanks to God, for the law which he had given them from Mount Sinai, on the 50th day after their coming out of Egypt.

The modern Jews celebrate the pentecoſt for two days. They deck the ſynagogue and their own houſes with garlands of flowers. They hear a ſermon or oration in praiſe of the law, which they ſuppoſe to have been delivered on this day. The Jews of Germany make a very thick cake, conſiſting of ſeven layers of paſte, which they call *Sinai*. The ſeven layers repreſent the ſeven heavens, which they think God was obliged to reaſcend from the top of this mountain. See *Leo of Modena* and *Buxtorf's ſynag. Jud.*

It was on the feaſt of pentecoſt that the Holy Ghoſt miraculouſly deſcended on the apoſtles of our Lord, who were aſſembled together after his aſcenſion in a houſe at Jeruſalem (Acts ii.).

PENTHESILEA, queen of the Amazons, ſucceeded Orythia, and gave proofs of her courage at the ſiege of Troy, where ſhe was killed by Achilles. Pliny ſays that ſhe invented the battle-axe.

PENTHORUM, in *Botany*, a genus of the pentagynia order, belonging to the pentandria claſs of plants. The calyx is quinquefid; there are either five petals or none; the capſule is five-pointed and quinquelocular.

PENTLAND or PICTLAND FRITH, is a narrow ſtrait of ſix miles between the mainland of Scotland and the Orkney iſles. This ſtrait is the great thoroughfare of ſhipping between the eaſtern and weſtern ſeas, the terror of mariners, and has been the grave of thouſands. The navigation of this frith was formerly extremely dangerous by the iſland of Stroma, and two rocks called the *Skerries*, lying near the middle of it; but it is now greatly improved, and comparatively ſafe, in conſequence of a lighthouſe erected on the Skerries.

PENULA, among the ancient Romans, was a coarſe garment or cloak worn in cold or rainy weather. It was ſhorter than the lacerna, and therefore more proper for travellers. It was generally brown, and ſucceeded the toga after the ſtate became monarchical. Auguſtus aboliſhed the cuſtom of wearing the penula over the toga, conſidering it as too effeminate for Romans; and the ædiles had orders to ſuffer none to appear in the circus or forum with the lacerna or penula. Writers are not agreed as to the preciſe difference between theſe two articles of dreſs; but we are told that they were chiefly worn by the lower orders of people. See LACERNA.

PENULTIMA, or PENULTIMATE *Syllable*, in *Grammar*, denotes the laſt ſyllable but one of a word; and hence the antepenultimate ſyllable is the laſt but two, or that immediately before the penultima.

PENUMBRA, in *Aſtronomy*, a partial ſhade obſerved between the perfect ſhadow and the full light in an eclipſe. It ariſes from the magnitude of the ſun's body: for were he only a luminous point, the ſhadow would be all perfect; but, by reaſon of the diameter of the ſun, it happens, that a place which is not illuminated by the whole body of the ſun, does yet receive rays from a part thereof.

PEON, in the language of Hindoſtan, means a foot ſoldier, armed with ſword and target. In common uſe it is a footman, ſo armed, employed to run before a palanquin. *Piaaah* is the proper word; from which *peon* is a corruption.

PEOR, a famous mountain beyond Jordan, which Euſebius places between Heſhbon and Livias. The mountains Nebo, Piſgah, and Peor, were near one another, and probably made but the ſame chain of mountains. It is very likely that Peor took its name from ſome deity of the ſame name, which was worſhipped there; for Peor, Phegor, or Baal-peor, was known in this country. See Numb. xxv. 3. Deut. iv. 3. Pſal. cv. 28.

PEOR, was a city of the tribe of Judah, which is not read in the Hebrew, nor in the Vulgate, but only in the Greek of the Septuagint (Joſh. xv. 60.). Euſebius ſays it was near Bethlehem, and Jerome adds, that in his time it was called *Paora*.

PEPIN DE HERISTAL, or LE GROS, mayor of the palace under Clovis III. Childebert, and Dagobert. The power of theſe mayors in France was ſo great, that they left the ſovereign only the empty title, and in the end ſeized on the throne itſelf.

Pe[illegible] le Bref, or *le Petit*, grandſon to Pepin the [illegible] of the ſecond race of French monarchs, Plate CCCLX.

PERAMBULATOR.

Fig. 1.

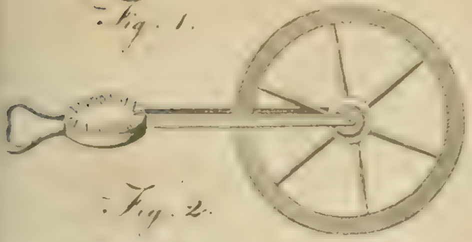
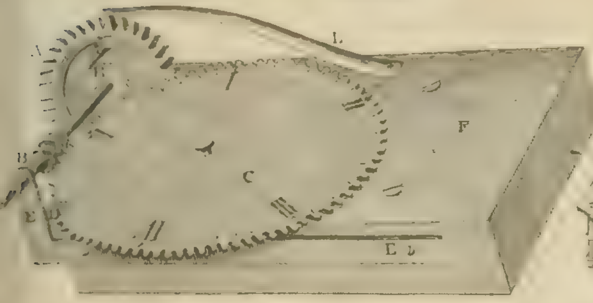
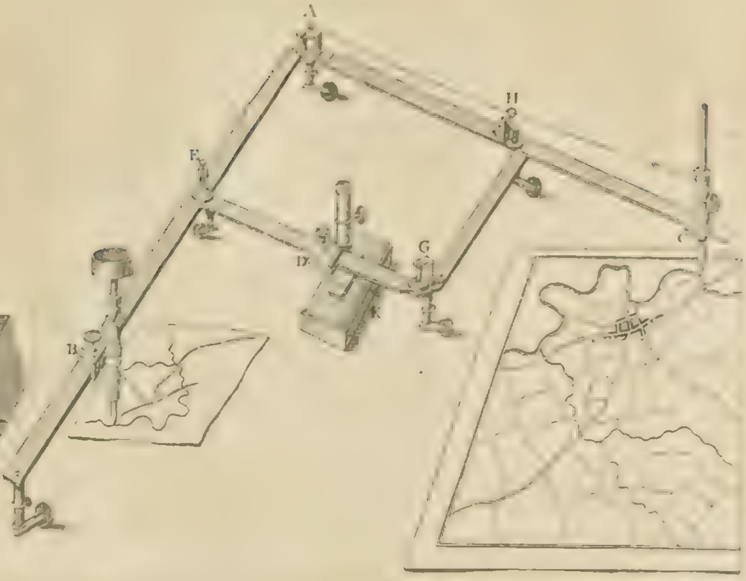


Fig. 2.



PENTAGRAPH.



PERSEPOLIS.

[illegible]

Peplis
||
Pepper-Water.

narchs, was mayor of the palace to Childeric III. a weak prince: he contrived to confine him and his ſon Thierri in different monaſteries; and then, with the aſſiſtance of Pope Stephen III. he uſurped the ſovereign power. He died in 768, aged 54.

PEPLIS, a genus of plants belonging to the hexandria claſs, and in the natural method ranking under the 17th order, *Calycanthemæ*. See BOTANY *Index*.

PEPLUS, a long robe worn by the women in ancient times, reaching down to the feet, without ſleeves, and ſo very fine, that the ſhape of the body might be ſeen through it. The Athenians uſed much ceremony in making the peplus, and dreſſing the ſtatue of Minerva with it. Homer makes frequent mention of the peplus of that goddeſs.

PEPPER, PIPER, in *Natural Hiſtory*, an aromatic berry of a hot quality, chiefly uſed in ſeaſoning. We have three kinds of pepper at preſent uſed in the ſhops, the black, the white, and the long pepper.

Black pepper is the fruit of the piper, and is brought from the Dutch ſettlements in the Eaſt Indies. See PIPER, BOTANY *Index*.

The common white pepper is factitious, being prepared from the black in the following manner: they ſteep this in ſea-water, expoſed to the heat of the ſun for ſeveral days, till the rind or outer bark looſens; they then take it out, and, when it is half dry, rub it till the rind falls off; then they dry the white fruit, and the remains of the rind blow away like chaff. A great deal of the heat of the pepper is taken off by this proceſs, ſo that the white kind is more fit for many purpoſes than the black. However, there is a ſort of native white pepper produced on a ſpecies of the ſame plant; which is much better than the factitious, and indeed little inferior to the black.

The long pepper is a dried fruit, of an inch or an inch and a half in length, and about the thickneſs of a large gooſe quill: it is of a browniſh gray colour, cylindrical in figure, and ſaid to be produced on a plant of the ſame genus.

Pepper is principally uſed by us in food, to aſſiſt digeſtion: but the people in the Eaſt Indies eſteem it as a ſtomachic, and drink a ſtrong infuſion of it in water by way of giving them an appetite: they have alſo a way of making a fiery ſpirit of fermented freſh pepper with water, which they uſe for the ſame purpoſes. They have alſo a way of preſerving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, or *Pimento*. See LAURUS, BOTANY *Index*.

PEPPER-Mint. See MENTHA, BOTANY and MATERIA MEDICA *Index*.

PEPPER-Pot. See CAPSICUM, BOTANY *Index*.

PEPPER-Water, a liquor prepared in the following manner, for microſcopical obſervations: Put common black pepper, groſsly powdered, into an open veſſel ſo as to cover the bottom of it half an inch thick, and put to it rain or river water, till it covers it an inch; ſhake or ſtir the whole well together at the firſt mixing, but never diſturb it afterwards: let the veſſel be expoſed to the air uncovered; and in a few days there will be ſeen a pellicle or thin ſkin ſwimming on the ſurface of the liquor, looking of ſeveral colours.

This is a congeries of multitudes of ſmall animals; and being examined by the microſcope, will be ſeen all in motion: the animals, at firſt ſight, are ſo ſmall as not to be diſtinguiſhable, unleſs to the greateſt magnifiers; but they grow daily till they arrive at their full ſize. Their numbers are alſo continually increaſing, till the whole ſurface of the liquor is full of them, to a conſiderable depth. When diſturbed, they will ſometimes all dart down to the bottom; but they ſoon after come up to the ſurface again. The ſkin appears ſooneſt in warm weather, and the animals grow the quickeſt: but in the ſevereſt cold it will ſucceed, unleſs the water freezes.

Pepper-mint-tree
||
Perambulator.

About the quantity of a pin's head of this ſcum, taken up on the nib of a new pen, or the tip of a hair-pencil, is to be laid on a plate of clear glaſs; and if applied firſt to the third magnifier, then to the ſecond, and finally to the firſt, will ſhow the different animalcules it contains, of ſeveral kinds and ſhapes as well as ſizes.

PEPPERMINT-TREE. See EUCALYPTUS, BOTANY *Index*.

PERA, one of the ſuburbs of Conſtantinople, where ambaſſadors and Chriſtians uſually reſide. See CONSTANTINOPLE.

PERAMBULATOR, in ſurveying, an inſtrument for meaſuring diſtances, called alſo *odometer*, *pedometer*, *way-wiſer*, and *ſurveying-wheel*.

Plate CCCCIX. fig. 4.

It conſiſts of a wheel AA, fig. 1, two feet ſeven inches and a half in diameter; conſequently half a pole, or eight feet three inches, in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the eight teeth of another nut *c*, fixed on one end of an iron-rod Q, and thus turn the rod once round in the time the wheel makes one revolution. This rod, lying along a groove in the ſide of the carriage of the inſtrument, under the doted line, has at its other end a ſquare hole, into which is fitted the end *b* of a ſmall cylinder P. This cylinder is diſpoſed under the dial-plate of a movement, at the end of the carriage B, in ſuch a manner as to be moveable about its axis: its end *a* is cut into a perpetual ſcrew, which falling into the 32 teeth of a wheel perpendicular thereto, upon driving the inſtrument forward, that wheel makes a revolution each 16th pole. On the axis of this wheel is a pinion with ſix teeth, which falling into the teeth of another wheel of 60 teeth, carries it round every 160th pole, or half a mile.

This laſt wheel, carrying a hand or index round with it over the diviſions of a dial-plate, whoſe outer limb is divided into 160 parts, correſponding to the 160 poles, points out the number of poles paſſed over. Again, on the axis of this laſt wheel is a pinion, containing 20 teeth, which falling into the teeth of a third wheel which hath 40 teeth, drives it once round in 320 poles, or a mile. On the axis of this wheel is a pinion of 12 teeth, which, falling into the teeth of a fourth wheel having 72 teeth, drives it once round in 12 miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into 12 for miles, and each mile ſubdivided into halves, quarters, and furlongs, ſerves to regiſter the revolutions of the other hand, and to keep account of the half miles and miles paſſed over as far as 12 miles.

The uſe of this inſtrument is obvious from its conſtruction. Its proper office is in the ſurveying of roads and large distances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along and observing the hands, has the same effect as dragging the chain and taking account of the chains and links.

Its advantages are its handiness and expedition; its contrivance is ſuch, that it may be fitted to the wheel of a coach, in which ſtate it performs its office, and meaſures the road without any trouble at all.

The following is a deſcription of an inſtrument invented by Mr Edgeworth for the ſame purpoſe.

"This odometer," ſays Mr Edgeworth, "is more ſimple than any which I have ſeen, is leſs liable to be out of order, and may be eaſily attached to the axle-tree bed of a poſt-chaiſe, gig, or any other carriage.

"One turn and a half of a ſcrew is formed round the nave of one of the hinder wheels by a ſlip of iron three quarters of an inch broad and one-eighth of an inch thick; this is wound round the nave, and faſtened to it by ſcrews paſſing through five or ſix cocks, which are turned up at right angles on the ſlip of iron. The helix ſo formed on the nave of the carriage wheel acts as a worm or ſcrew upon the teeth of the wheel A, fig. 2. upon the arbor of which another ſcrew of braſs B is formed, which acts upon the braſs wheel C. This wheel C ſerves alſo as a dial-plate, and is divided into miles, halves, quarters, and furlongs; the figures indicating the miles are nearly three quarters of an inch long, ſo as to be quite diſtinct; they are pointed out by the index D, which is placed as repreſented in the plate, in ſuch a manner as to be eaſily ſeen from the carriage.

Fig. 2.

"Theſe two braſs wheels are mounted by the irons EE upon a block of wood F, eight inches long, two inches thick; and five inches broad. This block may be ſcrewed upon the axle-tree-bed by two ſtrong ſquare-headed wood ſcrews. If the carriage permits, this block ſhould be fixed obliquely on the axle-tree-bed, ſo that the dial-plate may be raiſed up toward the eye of the perſon looking out from the carriage.

"H. is a ratchet wheel attached to the arbor of the wheel A, which, by means of the click I, allows the wheel to be ſet with a key or handle fitted to the ſquared end of the arbor at K. L is a long ſpring ſcrewed on the block; it preſſes on the wheel A, to prevent it from ſhaking by the motion of the carriage. A ſmall triangular ſpring is put under the middle of the dial-plate wheel for the ſame purpoſe.

"If the wheel of the carriage is exactly five feet three inches in circumference, the braſs-toothed wheel which it turns ſhould have twenty teeth, and that which ſerves as a dial-plate ſhould have eighty; it will then count five miles. If the carriage wheel is either larger or ſmaller, a mile ſhould be carefully meaſured on a ſmooth road, and the number of turns which the carriage wheel makes in going this mile may eaſily be counted by tying a piece of fine packthread to one of the ſpokes, and letting the wheel, as it moves ſlowly forward, wind up the packthread on its nave. When the wheel has proceeded a half or a quarter of a mile, unwind the ſtring and count the number of turns which it has made.

"By the addition of another wheel of eighty-one teeth placed under the dial-plate wheel and moved by the ſcrew C, with a proper hand fitted to it, and proper figures on the dial-plate, this machine would count four hundred miles." *

It has been ſuppoſed that the ancient Romans were acquainted with an inſtrument of this kind. The foundation of this opinion is an expreſſion of Julius Capitolinus in his life of the emperor Pertinax. The words are, "*Et alia (vehicula), iter metientia, et horas monſtrantia.*" "Carriages for meaſuring the length of the road, and marking the time of the journey."

PERCA, the PERCH; a genus of fiſhes belonging to the order of thoracici. See ICHTHYOLOGY *Index*.

PERCEPTION, is a word which is ſo well underſtood, that it is difficult for the lexicographer to give any explanation of it. It has been called the firſt and moſt ſimple act of the mind by which it is conſcious of its own ideas. This definition, however, is improper, as it confounds perception with conſciouſneſs; although the objects of the former faculty are things without us, thoſe of the latter the energies of our own minds. Perception is that power or faculty by which, through the medium of the ſenſes, we have the cognizance of objects diſtinct and apart from ourſelves, and learn that we are but a ſmall part in the ſyſtem of nature. By what proceſs the ſenſes give us this information, we have endeavoured to ſhow elſewhere, (ſee METAPHYSICS, Part I. chap. i.); and we ſhould not again introduce the ſubject, but to notice a ſingular opinion of a very able writer, whoſe work has been given to the public ſince our article alluded to had iſſued from the preſs.

Dr Sayers has endeavoured to prove that no man can perceive two objects, or be conſcious of two ideas at the ſame inſtant. If this be true, not only our theory of time (ſee METAPHYSICS, Part II. chap. vii.) is groſsly abſurd, but even memory itſelf ſeems to be an imaginary faculty. If a man be not conſcious of his preſent exiſtence, at the very inſtant when he thinks of a paſt event, or reviews a ſeries of paſt tranſactions, it is difficult, to us indeed impoſſible, to conceive what idea he can have of time, or what he can mean when he ſays that he remembers a thing. But let us examine the reaſoning by which the ingenious author endeavours to eſtabliſh his opinion.

"If we reflect (ſays he †) upon the ſurpriſing velocity with which ideas paſs through the mind, and the remarkable rapidity with which the mind turns itſelf, or is directed from one object of contemplation to another, this might alone give us ſome ſuſpicion that we may probably be miſtaken in ſuppoſing ideas to be ſynchronouſly perceived. Other arguments, may be adduced to ſtrengthen this ſuſpicion. It will be granted, I believe, that the mind, whether immaterial or the reſult of organization, has certainly a wholeneſs or unity belonging to it, and that it is either not compoſed of parts, or that no one of the parts from which it originates is itſelf mind: in this caſe, it is difficult to conceive how two ideas ſhould be impreſſed upon the mind at the ſame inſtant: for this would be ſuppoſing that part of the mind could receive one idea, and part another, at the ſame time; but if the parts do not perceive ſingly, this is evidently impoſſible. If, on the other hand, this ſelf-diviſion of the mind does not take place, then if two ideas are nevertheleſs to be perceived at the ſame inſtant, it would ſeem that thoſe ideas muſt be ſo blended with each other, that neither of them could appear diſtinct. If we examine the manner in which a complex idea is perceived, we ſhall find very clearly, that the whole of ſuch an idea is never preſent to the mind at once. In thinking of a centaur, for inſtance,

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* Nich. Journ. 15. 81.

† Diſquiſitions Metaphyſical and Literary.

ſtance, can we at the ſame moment be thinking of the parts of a man and the parts of a horſe? Can we not almoſt detect the gliding of the mind from the one to the other? In contemplating the complex idea of gold, are the ideas of its colour, ductility, hardneſs, and weight, all preſent to the mind at the ſame inſtant? I think, if we accurately attended to it, we ſhall find a perceptible time has elapſed before this complex idea has been perfectly formed in our mind: but if all the parts of a complex idea cannot be recalled at the ſame inſtant, is it not reaſonable to infer that theſe parts are alſo ſingly impreſſed, and not all diſtinctly perceived at the ſame inſtant?"

This reaſoning is plauſible, but perhaps not convincing. Surely we have all been conſcious of bodily pain or pleaſure with our eyes open, and been offended by a diſagreeable ſmell at the very inſtant that we looked at objects beautifully coloured. That our ideas paſs through the mind with great velocity, and that the mind can rapidly turn itſelf from one ſubject of contemplation to another, are truths which cannot be controverted; but inſtead of leading us to ſuppoſe that two or more objects cannot be ſynchronouſly perceived, or two or more ideas ſynchronouſly apprehended, they appear to furniſh a complete proof of the reverſe of all this. For we beg leave to aſk how we come to know that ideas paſs with velocity through the mind, if we be not all the while conſcious of ſomething that is permanent? If we can contemplate but one idea at once, it is plainly impoſſible that two or more can be compared together; and therefore we cannot poſſibly ſay that any particular train has paſſed through the mind with a degree of velocity greater or leſs than that which we have uſually experienced; nay, we cannot ſay that we have ever experienced a train of ideas at all, or even been conſcious of a ſingle idea, beſides the immediate object of preſent apprehenſion. That the mind is an individual, we moſt readily grant; but that it ſhould therefore be incapable of having *two* ideas ſynchronouſly excited in it, is a propoſition for which the author has brought no evidence. That it is difficult to conceive *how* this is done, we acknowledge; but not that it is more difficult than to conceive how a *ſingle* idea is excited in the mind; for of the mode in which mind and matter mutually operate on each other, we can form no conception. We know that objects make an impreſſion on the organs of ſenſe; that this impreſſion is by the nerves communicated to the brain, and that the agitation of the brain excites ſenſation in the mind: but in *what way* it excites ſenſation we know not; and therefore have no reaſon to ſuppoſe that two or more different agitations may not excite two or more ſynchronous ſenſations, as well as one agitation excites one ſenſation. That the agitation given to the brain operates on the mind, is known by experience; but experience gives us no information reſpecting the *mode* of that operation. If the mind be, as our author and we ſuppoſe, one individual, it cannot, as mind, be either diviſible or extended; and therefore it is certain that the operation in queſtion cannot be, in the proper ſenſe of the word, impreſſion. Hence we have no right to infer, if two objects be perceived at once, either that the idea of the one muſt be impreſſed on a part of the mind different from that which receives the impreſſion of the other, or that the two impreſſions muſt be ſo blended with each other, that neither of them could appear diſtinct; for this would be to reaſon from one mode of operation to another; with which, upon no acknowledged principles, it can have nothing in common.

By far the greater part of our ideas are relicts of *viſible* ſenſations; and of every thing which we can actually ſee at once, we at once contemplate the idea. That we could at once perceive a centaur, if ſuch a being were preſented to us, cannot ſurely be doubted by any one who has ever looked at a man on horſeback; and therefore that we can at the ſame moment contemplate the whole idea of a centaur, is a fact of which conſciouſneſs will not permit us to doubt.—If, indeed, we chooſe to analyze this complex idea into its component parts, it is ſelf-evident that the mind muſt glide from the one to the other, becauſe the very analyſis conſiſts in the ſeparation of the parts, of which, if after that proceſs we think of them, we muſt think in ſucceſſion: but that we may have at the ſame inſtant, either an actual or ideal view of all the parts of the centaur united, is a propoſition ſo evident as to admit of no other proof than an appeal to experience. In contemplating what the author calls the complex idea of gold, it cannot be denied that the ideas of its colour, ductility, hardneſs, and weight, are never all preſent to the mind at the ſame inſtant: but the reaſon is obvious. Theſe are not all *ideas*, in the proper ſenſe of the word, but ſome of them are ideas, and ſome notions, acquired by very different proceſſes and very different faculties. Colour is an idea of ſenſation, immediately ſuggeſted through the organ of ſight; ductility is a relative notion, acquired by repeated experiments; and gold might be made the object of every ſenſe, without ſuggeſting any ſuch notion. The writer of this article never ſaw an experiment made on the ductility of gold, and has therefore a very obſcure and indiſtinct notion of that property of the metal; but he is conſcious, that he can perceive, at the ſame inſtant, the yellow colour and circular figure of a guinea, and have a very diſtinct, though relative notion, of its hardneſs.

We conclude, therefore, that the mind is capable of two or more ſynchronous perceptions, or ſynchronous ideas; that, during every train which paſſes through it, it is conſcious of its own permanent exiſtence; and that if it were limited to the apprehenſion of but one idea at once, it could have no remembrance of the paſt, or anticipation of the future, but would appear to itſelf, could it make any compariſon, to paſs away like a flaſh of lightning.

PERCH, in land meaſuring, a rod or pole of 16½ feet in length, of which 40 in length and 4 in breadth make an acre of ground. But, by the cuſtoms of ſeveral counties, there is a difference in this meaſure. In Staffordſhire it is 24 feet; and in the foreſt of Sherwood 25 feet: the foot being there 18 inches long; and in Herefordſhire a perch of ditching is 21 feet, the perch of walling 16½ feet, and a pole of denſhiered ground is 12 feet, &c.

PERCH, a fiſh. See PERCA, ICHTHYOLOGY *Index*.

PERCHE, a territory of Orleanois in France, [illegible] miles long, and 30 broad; bounded on the north by Normandy; on the ſouth, by Maine and Dunois; on the eaſt, by Beauce; and on the weſt, by Maine. It takes its name from a foreſt, and is pretty fertile. The inhabitants carry on a pretty good trade; and the principal town is Belleſme.

PERCOLATION, a chemical operation which is the ſame with FILTRATION.

PERCUSSION, in *Mechanics*, the impreſſion a body makes in falling or ſtriking upon another; or the ſhock of two bodies in motion. See DYNAMICS and MECHANICS.

PERDICIUM, a genus of plants, belonging to the ſyngeneſia claſs; and in the natural method ranking under the 49th order, *Compoſitæ*. See BOTANY *Index*.

PERDIX, the partridge. See TETRAO, ORNITHOLOGY *Index*.

PEREASLAW, a ſtrong populous town of Poland, in the palatinate of Kiovia, ſituated on the river Tribecz; in E. Long. 32. 44. N. Lat. 49. 46.

PERENNIALS, or PERENNIAL FLOWERS, in *Botany*, a term applied to thoſe plants whoſe roots abide many years, whether they retain their leaves in winter or not. Thoſe which retain their leaves are called *evergreens*; but ſuch as caſt their leaves are named *deciduous* or *perdifols*.

PERFECT, ſomething to which nothing is wanting, or that has all the requiſites of its nature and kind.

PERFECT Cadence, in *Muſic*. See CADENCE.

PERFECT Tenſe, in *Grammar*. See PRETERITE.

PERFECTION, the ſtate or quality of a thing PERFECT.

Perfection is divided, according to Chauvinus, into phyſical, moral, and metaphyſical.

Phyſical or natural perfection, is that whereby a thing has all its powers and faculties, and thoſe too in full vigour; and all its parts both principal and ſecondary, and thoſe in their due proportion, conſtitution, &c. in which ſenſe man is ſaid to be perfect when he has a ſound mind in a ſound body. This perfection is by the ſchools frequently termed ενεργητικη, becauſe a thing is enabled thereby to perform all its operations.

Moral perfection is an eminent degree of virtue or moral goodneſs, to which men arrive by repeated acts of piety, beneficence, &c. This is uſually ſubdivided into abſolute or inherent, which is actually in him to whom we attribute it; and imputative, which exiſts in ſome other, and not in him it is attributed to.

Metaphyſical, tranſcendental, or eſſential perfection, is the poſſeſſion of all the eſſential attributes, or of all the parts neceſſary to the integrity of a ſubſtance; or it is that whereby a thing has or is provided of every thing belonging to its nature. This is either abſolute, where all imperfection is excluded, ſuch is the perfection of God; or *ſecundum quid*, and in its kind.

PERFORANS, MANUS.
PERFORANS Pedis.
PERFORATUS MANUS.
PERFORATUS Pedis.
See ANATOMY, *Table of the Muſcles*.

PERFUME, denotes either the volatile effluvia from any body affecting the organ of ſmelling, or the ſubſtance emitting thoſe effluvia; in which laſt ſenſe the word is moſt commonly uſed. The generality of perfumes are made up of muſk, ambergris, civet, roſe and cedar woods, orange-flowers, jeſſamines, jonquils, tuberoſes, and other odoriferous flowers. Thoſe drugs commonly called aromatics, ſuch as ſtorax, frankincenſe, benzoin, cloves, mace, &c. enter the compoſition of a perfume; ſome are alſo compoſed of aromatic herbs or leaves, as lavender, marjoram, ſage, thyme, hyſſop, &c.

The uſe of perfumes was frequent among the Hebrews, and among the orientals in general, before it was known to the Greeks and Romans. In the time of Moſes perfumes muſt have been known in Egypt, ſince he ſpeaks of the art of the perfumer, and gives the compoſition of two kinds of perfumes (Exod. xxx. 25.), of which one was to be offered to the Lord upon the golden altar which was in the holy place; and the other was appointed for the anointing of the high prieſt and his ſons (*ibid.* 34, &c.), as alſo of the tabernacle, and all the veſſels that were uſed in divine ſervice.

The Hebrews had alſo perfumes which they made uſe of in embalming their dead. The compoſition is not known, but it is certain that they generally made uſe of myrrh, aloes, and other ſtrong and aſtringent drugs, proper to prevent putrefaction (John xix. 49.). See the article EMBALMING.

Beſides the perfumes for theſe purpoſes, the Scripture mentions other occaſions whereon the Hebrews uſed perfumes. The ſpouſe in the Canticles (i. 3.) commends the ſcent of the perfumes of her lover; and her lover in return ſays, that the ſcent of the perfumes of his ſpouſe ſurpaſſes the moſt excellent odours (*id.* iv. 10—14.). He names particularly the ſpikenard, the calamus, the cinnamon, the myrrh, and the aloes, as making a part of theſe perfumes. The voluptuous woman deſcribed by Solomon (Prov. vii. 17.) ſays, that ſhe had perfumed her bed with myrrh, aloes, and cinnamon. The epicures in the book of Wiſdom (ii. 7.) encourage one another to the luxuriant uſe of odours and coſtly perfumes.

Iſaiah (lvii. 9.) reproaches Judea, whom he deſcribes as a ſpouſe faithleſs to God, with being painted and perfumed to pleaſe ſtrangers, "Thou wenteſt to the king with ointment, and didſt increaſe thy perfumes." Ezekiel (xxiii. 41.) ſeems to accuſe the Jews with having profaned the odours and perfumes, the uſe of which was reſerved to ſacred things, by applying them to their own uſe.

They came afterwards to be very common among the Greeks and Romans, eſpecially thoſe compoſed of muſk, ambergris, and civet. The *nardus* and *malobathrum* were held in much eſtimation, and were imported from Syria. The *unguentum nardinum* was variouſly prepared, and contained many ingredients. *Malobathrum* was an Indian plant. Perfumes were alſo uſed at ſacrifices to regale the gods; at feaſts, to increaſe the pleaſures of ſenſation; at funerals, to overpower cadaverous ſmells, and pleaſe the manes of the dead; and in the theatres, to prevent the offenſive effluvia, proceeding from a crowd, from being perceived.

Since people are become ſenſible of the harm they do to the head, perfumes are generally diſuſed among us; however, they are ſtill common in Spain and Italy.

PERGAMA, (Virgil), the citadel of Troy; which, becauſe of its extraordinary height, gave name to all high buildings (Servius). Others ſay the walls of Troy were called *Pergama*.

PERGAMUM, (Pliny); called alſo *Pergamea*, (Virgil); *Pergamia*, (Plutarch); a town of Crete, built ergamum, ergamus.

built by Agamemnon in memory of his victory, (Velleius). Here was the burying-place of Lycurgus (Ariſtoxenus, quoted by Plutarch). It was ſituated near Cydonia (Servius); to what point not ſaid: but Scylax helps him out, who places the Dactymnean temple of Diana, which ſtood near Cydonia (Strabo), to the north of the territory of Pergamia.—Another PERGAMUM (Pliny, Strabo); a town of Myſia, ſituated on the Caïcus, which runs by it. It was the royal reſidence of Eumenes, and of the kings of the Attali (Livy). There an ancient temple of Æſculapius ſtood; an aſylum (Tacitus). The ornament of Pergamum was the royal library, vying with that of Alexandria in Egypt; the kings of Pergamum and Egypt rivalling each other in this reſpect (Pliny). Strabo aſcribes this rivalry to Eumenes. Plutarch reckons up 200,000 volumes in the library at Pergamum. Here the *membranæ pergamenæ*, whence the name *parchment*, were invented for the uſe of books, (Varro, quoted by Pliny). The country of Galen, and of Oribaſius chief phyſician to Julian the Apoſtate (Eunapius), called by ſome the *ape of Galen*. Here P. Scipio died (Cicero). Attalus ſon of Eumenes dying without iſſue, bequeathed his kingdom to the Roman people, who reduced it to a province, (Strabo). *Pergameus*, the epithet (Martial). Here was one of the nine *conventus juridici*, or aſſemblies of the *Aſia Romana*, called *Pergamenus*, and the ninth in order (Pliny); which he alſo calls *juriſdictio Pergamena*.

PERGAMUS, an ancient kingdom of Aſia, formed out of the ruins of the empire of Alexander the Great. It commenced about the year 283. The firſt ſovereign was one Philetærus an eunuch, by birth a Paphlagonian, of a mean deſcent, and in his youth a menial ſervant to Antigonus one of Alexander's captains. He afterwards ſerved Lyſimachus king of Macedon and Thrace, who appointed him keeper of his treaſures lodged in Pergamus. While he held this employment, having fallen under the diſpleaſure of Arſinoe wife to Lyſimachus, ſhe found means to make a quarrel between him and his maſter; upon which Philetærus ſeized on the caſtle of Pergamus, together with the treaſures entruſted to his care, amounting to 90,000 talents. At firſt he offered his ſervice, together with his treaſure, to Seleucus king of Syria: but both Seleucus and Lyſimachus dying ſoon after, he kept poſſeſſion of the town and treaſure alſo till his death; which happened 20 years after his revolt from Lyſimachus.

Philetærus left the city of Pergamus to his brother, or, according to ſome, to his brother's ſon Eumenes I. and he, laying hold of the opportunity offered by the diſſenſions among the Seleucidæ, poſſeſſed himſelf of many ſtrong-holds in the province of Aſia; and having hired a body of Galatians, defeated Antiochus, as he was returning from a victory gained over his brother Seleucus Callinicus. By this victory he obtained poſſeſſion of the greater part of Aſia: however, he did not long enjoy his acquiſitions; for he died next year of immoderate drinking, a vice to which he was greatly addicted.

Eumenes was ſucceeded by Attalus I. nephew of Philetærus, and the firſt who took upon him the title of king of Pergamus. He defeated the Gauls, who were deſirous of ſettling in his territory; and, according to Livy, was the firſt of the Aſiatic princes who refuſed to pay a contribution to theſe barbarians.

Pergamus

When Seleucus Ceraunus was engaged in other wars, he invaded his territories, and conquered all the provinces on this ſide of Mount Taurus; but was ſoon driven out of his new acquiſitions by Seleucus and his grandfather Achæus, who entering into an alliance againſt him, deprived him of all his newly acquired territories, and even beſieged him in his capital. Upon this Attalus invited to his aſſiſtance the Gauls who had ſettled in Thrace: and with their help not only obliged the enemy to raiſe the ſiege of Pergamus, but quickly recovered all the provinces he had loſt. After this he invaded Ionia and the neighbouring provinces, where ſeveral cities voluntarily ſubmitted to him. The Teians, Colophonians, with the inhabitants of Egea and Lemnos, ſent deputies declaring themſelves ready to acknowledge him for their ſovereign; the Carſenes, on the other ſide the river Lycus, opened their gates to him, having firſt expelled the governor ſet over them by Achæus. From thence he advanced to Apia, and encamping on the banks of the river Megithus, received homage from the neighbouring nations. But here the Gauls, being frightened by an eclipſe of the moon, refuſed to proceed farther; which obliged Attalus to return to the Helleſpont, where he allowed his allies to ſettle, giving them a large and fruitful territory, and promiſing that he would always aſſiſt and protect them to the utmoſt of his power.

Attalus having thus ſettled his affairs with equal honour and advantage to himſelf, entered into an alliance with Rome, and afterwards joined them in their war againſt Philip king of Macedon. Here he had the command of the Rhodian fleet; with which he not only drove the Macedonians quite out of the ſeas, but having landed his men, he, in conjunction with the Athenians, invaded Macedon, and obliged Philip to raiſe the ſiege of Athens, which he had greatly diſtreſſed; for which ſervices the Athenians not only heaped on him all the favours they could, but called one of their tribes by his name; an honour they had never beſtowed on any foreigner before.

Attalus, not contented with all he had yet done againſt Philip, attempted to form a general confederacy of the Greeks againſt him. But while he was haranguing the Bœotians to this purpoſe, and exhorting them with great vehemence to enter into an alliance with the Romans againſt their common enemy, he fell down ſpeechleſs. However, he came to himſelf again, and deſired to be carried by ſea from Thebes to Pergamus, where he died ſoon after his arrival, in the 72d year of his age and 43d of his reign.

This prince was a man of great generoſity, and ſuch an enthuſiaſt in learning and learned men, that he cauſed a grammarian named *Daphidas* to be thrown into the ſea from the top of a high rock, becauſe he ſpoke diſreſpectfully of Homer.

Attalus was ſucceeded by his eldeſt ſon Eumenes II. He was exceedingly attached to the Romans, inſomuch that he refuſed the daughter of Antiochus the Great in marriage, leſt he ſhould thus have been led into a difference with that people. He alſo gave notice to the Roman ſenate of the tranſactions of Ariarathes king of Cappadocia, who was making great preparations both by ſea and land. Nor did Eumenes ſtop here: for

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when he ſaw the war about to break out between Antiochus and the Romans, he ſent his brother Attalus to Rome to give information of the proceedings of Antiochus. The ſenate heaped honours both on Eumenes and his brother; and in the war which followed, gave the command of their fleet to the king of Pergamus in conjunction with C. Livius Salinator. The victory gained on this occaſion was in a great meaſure owing to Eumenes, who boarded ſome of the enemy's ſhips in perſon, and during the whole action behaved with uncommon bravery. Some time afterwards Eumenes, entering the territories of Antiochus with a body of 5000 men, ravaged all the country about Thyatira, and returned with an immenſe booty. But in the mean time Antiochus invading Pergamus in his turn, ravaged the whole country, and even laid ſiege to the capital. Attalus, the king's brother, held out with a handful of men till the Achæans, who were in alliance with Eumenes, ſent 1000 foot and 100 horſe to his aſſiſtance. As this ſmall body of auxiliaries were all choſen men, and commanded by an experienced officer, they behaved with ſuch bravery that the Syrians were obliged to raiſe the ſiege. At the battle of Magneſia, too, Eumenes behaved with the greateſt bravery: not only ſuſtaining the firſt attack of the enemy's elephants, but driving them back again on their own troops, which put the ranks in diſorder, and gave the Romans an opportunity of giving them a total defeat by attacking them opportunely with their horſe. In conſequence of this defeat, Antiochus was obliged to conclude a peace with the Romans on ſuch terms as they pleaſed to preſcribe; one of which was, that he ſhould pay Eumenes 400 talents, and a quantity of corn, in recompence for the damage he had done him.

Eumenes now thought of obtaining ſome reward from the Romans equivalent to the ſervices he had done them. Having gone to Rome, he told the ſenate, that he was come to beg of them that the Greek cities which had belonged to Antiochus before the commencement of the late war, might now be added to his dominions; but his demand was warmly oppoſed by the ambaſſadors from Rhodes, as well as by deputies from all the Greek cities in Aſia. The ſenate, however, after hearing both parties, decided the matter in favour of Eumenes, adding to his dominions all the countries on this ſide of Mount Taurus which belonged to Antiochus; the other provinces lying between that mountain and the river Mæander, excepting Lycia and Caria, were beſtowed on the Rhodians. All the cities, which had paid tribute to Attalus, were ordered to pay the ſame to Eumenes; but ſuch as had been tributary to Antiochus were declared free.

Soon after this Eumenes was engaged in a war with Pruſias king of Bithynia, who made war upon him by the advice of Hannibal the celebrated Carthaginian general. But Eumenes, being aſſiſted by the Romans, defeated Pruſias in an engagement by ſea, and another by land; which ſo diſheartened him, that he was ready to accept of peace on any terms. However, before the treaty was concluded, Hannibal found means to draw Philip of Macedon into the confederacy, who ſent Philocles, an old and experienced officer, with a conſiderable body of troops to join Pruſias. Hereupon Eumenes ſent his brother Attalus to Rome with a golden crown, worth 15,000 talents, to complain of Pruſias for making war on the allies of the Roman people without any provocation. The ſenate accepted the preſent, and promiſed to adjuſt every thing to the ſatisfaction of their friend Eumenes, whom they looked upon to be the moſt ſteady ally they had in Aſia. But in the mean time Pruſias, having ventured another ſea-fight, by a contrivance of Hannibal's, gained a complete victory. The Carthaginian commander adviſed him to fill a great many earthen veſſels with various kinds of ſerpents and other poiſonous reptiles, and in the heat of the fight to throw them into the enemies ſhips ſo as to break the pots and let the ſerpents looſe. All the ſoldiers and ſeamen were commanded to attack the ſhip in which Eumenes was, and only to defend themſelves as well as they could againſt the reſt; and that they might be in no danger of miſtaking the ſhip, a herald was ſent before the engagement with a letter to the king. As ſoon as the two fleets drew near, all the ſhips of Pruſias, ſingling out that of Eumenes, diſcharged ſuch a quantity of ſerpents into it, that neither ſoldiers nor ſailors could do their duty, but were forced to fly to the ſhore, leſt they ſhould fall into the enemy's hands. The other ſhips, after a faint reſiſtance, followed the king's example, and were all driven aſhore with great ſlaughter, the ſoldiers being no leſs annoyed by the ſtings of the ſerpents, than by the weapons of the enemy. The greateſt part of the ſhips of Eumenes were burnt, ſeveral taken, and the others ſo much ſhattered that they became quite unſerviceable. The ſame year Pruſias gained two remarkable victories over Eumenes by land, both of which were entirely owing to ſtratagems of Hannibal. But, while matters were thus going on to the diſadvantage of Eumenes, the Romans interfered, and by their deputies not only put an end to the differences between the two kings, but prevailed on Pruſias to betray Hannibal; upon which he poiſoned himſelf, as hath been related under the article HANNIBAL.

Eumenes being thus freed from ſuch a dangerous enemy, engaged in a new war with the kings of Cappadocia and Pontus, in which alſo he proved victorious. His friendſhip for the Romans he carried to ſuch a degree of enthuſiaſm, that he went in perſon to Rome to inform them of the machinations of Perſes king of Macedon. He had before quarrelled with the Rhodians, who ſent ambaſſadors to Rome to complain of him. But as the ambaſſadors happened to arrive while the king himſelf was preſent in the city, the Rhodian ambaſſadors could not obtain any hearing, and Eumenes was diſmiſſed with new marks of favour. This journey, however, had almoſt proved fatal to him; for, on his return, as he was going to perform a ſacrifice at Delphi, two aſſaſſins, ſent by Perſes, rolled down two great ſtones upon him as he entered the ſtraits of the mountains. With one he was dangerouſly wounded on the head, and with the other on the ſhoulder. He fell with the blows from a ſteep place, and thus received many other bruiſes; ſo that he was carried on board his ſhip when it could not well be known whether he was dead or alive. His people, however, ſoon finding that he was ſtill alive, conveyed him to Corinth, and from Corinth to Ægina, having cauſed their veſſels to be carried over the iſthmus.

Eumenes remained at Ægina till his wounds were cured,

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cured, which was done with ſuch ſecrecy, that a report of his death was ſpread all over Aſia, and even believed at Rome; nay, his brother Attalus was ſo convinced of the truth of this report, that he not only aſſumed the government, but even married Stratonice the wife of Eumenes. But in a ſhort time Eumenes convinced them both of his being alive, by returning to his kingdom. On the receipt of this news, Attalus reſigned the ſovereignty in great haſte, and went to meet his brother; carrying a halberd, as one of his guards. Eumenes received both him and the queen with great tenderneſs, nor did he ever ſay any thing which might tend to make them uneaſy; only it is ſaid he whiſpered in his brother's ear when he firſt ſaw him, "Be in no haſte to marry my wife again till you are ſure that I am dead."

The king being now more than ever exaſperated againſt Perſes, joined the Romans in their war againſt him; but during the courſe of it he ſuddenly cooled in his affection towards theſe allies whom he had hitherto ſerved with ſo much zeal, and that to ſuch a degree, that he admitted ambaſſadors from Perſes, and offered to ſtand neuter if he would pay him 1000 talents, and for 1500, to influence the Romans to grant him a ſafe and honourable peace. But theſe negociations were broke off without effect, by reaſon of the diſtruſt which the two kings had of one another. Eumenes could not truſt Perſes unleſs he paid him the money beforehand; while, on the other hand, Perſes did not care to part with the money before Eumenes had performed what he promiſed; neither could he be induced to pay the ſum in queſtion, though the king of Pergamus offered to give hoſtages for the performance of his promiſe. What the reaſon of ſuch a ſudden change in the diſpoſition of Eumenes was, is nowhere told; however, the fact is certain. The negociations above mentioned were concealed from the Romans as long as poſſible; but they ſoon came to be known: after which the republic began to entertain no ſmall jealouſy of their old friend, and therefore heaped favours on his brother Attalus, without taking any notice of the king himſelf. Eumenes had ſent him to Rome to congratulate the ſenate on the happy iſſue of the war with Perſes, not thinking that his practices had been diſcovered. However, the ſenate, without taking any notice of their diſaffection to Eumenes at firſt, entertained Attalus with the greateſt magnificence; then ſeveral of the ſenators who viſited him proceeded to acquaint him with their ſuſpicions of the king, and deſired Attalus to treat with them in his own name, aſſuring him, that the kingdom of Pergamus would be granted him, if he demanded it, by the ſenate. Theſe ſpeeches had at firſt ſome effect; but Attalus, being of an honeſt diſpoſition, and aſſiſted by the advice of a phyſician called *Stratius*, a man of great probity, reſolved not to comply with their deſire. When he was admitted to the ſenate, therefore, he firſt congratulated them on the happy iſſue of the Macedonian war, then modeſtly recounted his own ſervices; and laſtly, acquainted them with the motive of his journey; entreated them to ſend ambaſſadors to the Gauls, who by their authority might ſecure his brother from any danger of their hoſtilities; and he requeſted them alſo, that the two cities of Ænus and Maronea might be beſtowed on himſelf. The ſenate, imagining that Attalus deſigned to chooſe ſome other day to ſue for his brother's kingdom, not only granted all his requeſts, but ſent him richer and more magnificent preſents than they had ever done before. Upon this Attalus immediately ſet out on his return to Pergamus; which ſo provoked the ſenators, that they declared the cities free which they had promiſed to Attalus, thus rendering ineffectual their promiſe which they were aſhamed openly to revoke; and as for the Gauls, who were on all occaſions ready to invade the kingdom of Pergamus, they ſent ambaſſadors to them, with inſtructions to behave in ſuch a manner as would rather tend to encourage them in their deſign than diſſuade them from it.

Eumenes, being alarmed at theſe proceedings, reſolved to go in perſon to Rome, in order to juſtify himſelf. But the ſenate, having already condemned him in their own minds, reſolved not to hear his vindication. For this reaſon, as ſoon as they heard of his deſign, they made an act that no king ſhould be permitted to enter the gates of Rome. Eumenes, however, who knew nothing of this act, ſet forward on his journey, and landed at Brunduſium; but no ſooner did the Roman ſenate get intelligence of his arrival there, than they ſent a quæſtor acquainting him with the decree of the ſenate; and telling him at the ſame time, that if he had any buſineſs to tranſact with the ſenate, he was appointed to hear it, and tranſmit it to them; but if not, that the king muſt leave Italy without delay. To this Eumenes replied, that he had no buſineſs of any conſequence to tranſact, and that he did not ſtand in need of any of their aſſiſtance; and without ſaying a word more, went on board his ſhip, and returned to Pergamus.

On his return home, the Gauls, being encouraged by the cold reception which he had met with at Rome, invaded his territories, but were repulſed with great loſs by the king, who afterwards invaded the dominions of Pruſias, and poſſeſſed himſelf of ſeveral cities. This produced new complaints at Rome; and Eumenes was accuſed, not only by the ambaſſadors of Pruſias, but alſo by thoſe of the Gauls and many cities in Aſia, of keeping a ſecret correſpondence with Perſes king of Macedon. This laſt charge was confirmed by ſome letters which the Romans themſelves had intercepted; ſo that Eumenes found it impoſſible to keep up his credit any longer at Rome, though he ſent his brothers Athenæus and Attalus thither to intercede for him. The ſenators, in ſhort, had conceived the moſt implacable hatred againſt him, and ſeemed abſolutely bent on his deſtruction, when he died, in the 39th year of his reign, leaving his kingdom and his wife to his brother Attalus. He left one ſon, but he was an infant, and incapable of governing the kingdom: for which reaſon Eumenes choſe rather to give the preſent poſſeſſion of the crown to his brother, reſerving the ſucceſſion to his ſon, than to endanger the whole by committing the management of affairs to his ſon's tutors.

Attalus, in the beginning of his reign, found himſelf greatly diſtreſſed by Pruſias king of Bithynia, who not only overthrew him in a pitched battle, but advanced to the very walls of Pergamus, ravaging the country as he marched along; and at laſt reduced the royal city itſelf. The king, however, ſaved himſelf by a timely flight, and diſpatched ambaſſadors to Rome, complaining of the bad uſage of Pruſias. The latter endeavoured to defend himſelf, and to throw the blame on Attalus. But, after a proper inquiry was made into the matter, Pruſias was found to be entirely in the wrong; in conſequence of which, he was at laſt obliged to conclude a peace with his adverſary on the following terms. 1. That he ſhould immediately deliver up to Attalus 20 ſhips with decks. 2. That he ſhould pay 500 talents to Attalus within the ſpace of 20 years. 3. That he ſhould pay 100 talents to ſome of the other Aſiatic nations by way of reparation for the damages they had ſuſtained from him. And, 4. Both parties ſhould be content with what they had before the beginning of the war.

Some time after this, Pruſias having made an unnatural attempt on the life of his ſon Nicomedes, the latter rebelled, and, with the aſſiſtance of Attalus, drove his father from the throne, and, as is ſaid, even murdered him in the temple of Jupiter. The Romans took no notice of theſe tranſactions, but ſhowed the ſame kindneſs to Attalus as formerly. The laſt enterpriſe in which we find Attalus engaged, was againſt Andriſeus the pretended ſon of Perſes king of Macedon, where he aſſiſted the Romans; after which he gave himſelf up entirely to eaſe and luxury, committing ſtate affairs entirely to his miniſters; and thus continued to his death, which happened in the 82d year of his age, about 138 B. C.

Attalus II. was ſucceeded by Attalus III. the ſon of Eumenes; for the late king, conſidering that he only held the crown as a truſt for his nephew, paſſed by his own children in order to give it to him, though he appears to have been by no means worthy of it. He is ſaid to have been deprived of his ſenſes through the violence of his grief for his mother's death; and indeed, throughout his whole reign, he behaved more like a madman than any thing elſe. Many of his ſubjects of the higheſt quality were cut off with their wives and children, upon the moſt groundleſs ſuſpicions; and for theſe executions he made uſe of mercenaries hired out from among the moſt barbarous nations. Thus he proceeded till he had cut off all the beſt men in the kingdom; after which he fell into a deep melancholy, imagining that the ghoſts of thoſe whom he had murdered were perpetually haunting him. On this he ſhut himſelf up in his palace, put on a mean apparel, let his hair and beard grow, and ſequeſtered himſelf from all mankind. At laſt he withdrew from the palace, and retired into a garden, which he cultivated with his own hands, and filled with all ſorts of poiſonous herbs. Theſe he uſed to mix with wholeſome pulſe, and ſend packets of them to ſuch as he ſuſpected. At laſt, being weary of this amuſement, and living in ſolitude, becauſe nobody durſt approach him, he took it in his head to follow the trade of a founder, and make a brazen monument. But, while he laboured at melting and caſting the braſs, the heat of the ſun and furnace threw him into a fever, which in ſeven days put an end to his tyranny, after he had ſat on the throne five years.

On the death of the king, a will was found, by which he left the Roman people heirs of all his goods; upon which they ſeized on the kingdom, and reduced it to a province of their empire by the name of *Aſia Proper*. But Ariſtonicus, a ſon of Eumenes by an Epheſian courteſan, reckoning himſelf the lawful heir to the crown, could by no means be ſatisfied with this uſurpation of the Romans, and therefore aſſembled a conſiderable army to maintain his pretenſions. The people in general, having been accuſtomed to a monarchy, dreaded a republican form of government; in conſequence of which, they aſſiſted Ariſtonicus, and ſoon put him in a condition to reduce the whole kingdom. The news, however, were ſoon carried to Rome; and Licinius Craſſus, the pontifex maximus, was ſent into the eaſt, with orders to enforce obedience to the king's will. Hiſtorians take no notice of any forces which were ſent along with this commander; whence it is ſuppoſed, that he depended on aſſiſtance from the Aſiatics, who were in alliance with Rome, or from the Egyptians. But when he came thither, he found both the Syrians and Egyptians ſo reduced, that he could not expect any aſſiſtance from them. However, he was ſoon ſupplied with troops in plenty by the kings of Pontus, Bithynia, Cappadocia, and Paphlagonia; but managed matters ſo ill, that he was entirely defeated and taken priſoner. Thoſe who took him, deſigned to carry him to Ariſtonicus; but he, not able to endure the diſgrace, would have laid violent hands on himſelf if he had not been diſarmed. However, being allowed to keep a rod for managing the horſe on which he ſat, he ſtruck a Thracian ſoldier who ſtood near him ſo violently with it, that he beat out one of his eyes; upon which the other drew his ſword, and run him through on the ſpot. His head was brought to Ariſtonicus, who expoſed it to public view; but the body was honourably buried.

Ariſtonicus had no great time to enjoy the fruits of his victory. Indeed he behaved very improperly after it; for, inſtead of preparing to oppoſe the next army, which he might have been aſſured the Romans would ſend againſt him, he ſpent his time in feaſting and revelling. But he was ſoon rouſed out of his lethargy by Perpenna the new conſul, who having aſſembled with incredible expedition the troops of the allies, came unexpectedly upon him, obliged him to venture an engagement at a diſadvantage, and entirely defeated him. Ariſtonicus fled to a city called *Stratonice*, but was ſo cloſely purſued by the conqueror, that the garriſon, having no method of ſupplying themſelves with proviſions, delivered up their leader, as well as a philoſopher named *Bloſius*, who had been the companion and counſellor of Ariſtonicus. The philoſopher behaved with great reſolution after being taken, and openly defended his ſiding with Ariſtonicus, becauſe he thought his cauſe juſt. He exhorted the latter to prevent the diſgrace and miſery of captivity by a voluntary death; but Ariſtonicus, looking upon death as a greater miſery than any captivity, ſuffered himſelf to be treated as his conquerors pleaſed.

In the mean time, a new conſul, named *Manius Aquilius*, being arrived from Rome, ſent a moſt haughty meſſage to Perpenna, requiring him immediately to deliver up Ariſtonicus, as a captive belonging to his triumph when the war ſhould be ended. With this demand Perpenna refuſed to comply, and his refuſal had almoſt produced a civil war. However, this was prevented by the death of Perpenna, which happened ſoon after the diſpute commenced. The Pergamenians, notwithſtanding the defeat and captivity of their leader, ſtill held out with ſuch obſtinacy, that Aquilius was obliged to beſiege, and take by force, almoſt every city in the kingdom. In doing this, he took a very effectual, tard, though exceeding cruel method. Moſt of the cities in the kingdom had no other water than what was brought from a conſiderable diſtance in aqueducts. Theſe Aquilius did not demoliſh, but poiſoned the water, which produced the greateſt abhorrence of him throughout all the eaſt. At laſt, however, the whole country being reduced, Aquilius triumphed, the unhappy Ariſtonicus was led in chains before his chariot, and probably ended his miſerable life in a dungeon. The country remained ſubject to the Romans while their empire laſted, but is now in the hands of the Turks. The city is half ruined, and is ſtill known by the name of *Pergamus*. It is inhabited by about 3000 Turks, and a few families of poor Chriſtians. E. Long. 27. 27. N. Lat. 39. 3.

PERGUNNAH, in the language of Hindoſtan, means the largeſt ſubdiviſion of a province, whereof the revenues are brought to one particular *head Cutchery*, from whence the accounts and caſh are tranſmitted to the general *Cutchery* of the province.

PERIAGOGE, in *Rhetoric*, is uſed where many things are accumulated into one period which might have been divided into ſeveral.

PERIAGUA, a kind of large canoe made uſe of in the Leeward iſlands, South America, and the gulf of Mexico. It is compoſed of the trunks of two trees hollowed and united together; and thus differs from the canoe, which is formed of one tree.

PERIANDER, tyrant of Corinth and Corcyra, was reckoned among the ſeven wiſe men of Greece; though he might rather have been reckoned among the moſt wicked men, ſince he changed the government of his country, deprived his countrymen of their liberty, uſurped the ſovereignty, and committed the moſt ſhocking crimes. In the beginning of his reign he behaved with mildneſs; but after his having ſent to the tyrant of Syracuſe to conſult him on the ſafeſt method of government, he abandoned himſelf to cruelty. The latter, having heard Periander's envoys, took them into a field, and, inſtead of anſwering them, pulled up before them the ears of corn which exceeded the reſt in height. Periander, on being told of this action, underſtood what was meant by it. He firſt ſecured himſelf by a good guard, and then put the moſt powerful Corinthians to death. He abandoned himſelf to the moſt enormous crimes; committed inceſt with his mother, kicked to death his wife Meliſſa, daughter of Procles king of Epidaurus, notwithſtanding her being with child; and was ſo enraged at Lycophron, his ſecond ſon, for lamenting his mother's death, that he baniſhed him into the iſland of Corcyra. Yet he paſſed for one of the greateſt politicians of his time; and Heraclides tells us, that he forbade voluptuouſneſs; that he impoſed no taxes, contenting himſelf with the cuſtom ariſing from the ſale and the import and export of commodities; that, tho' wicked himſelf, he hated the wicked, and cauſed all pimps to be drowned: laſtly, that he eſtabliſhed a ſenate, and ſettled the expence of its members. He died 585 B. C.

PERIANTHIUM, (from περι "round," and ἄνθος "the flower,") the flower cup properly ſo called, the moſt common ſpecies of calyx, placed immediately under the flower, which is contained in it as in a cup. See BOTANY *Index*.

PERICARDIUM, in *Anatomy*, a membranous bag filled with water, which contains the heart in man and many other animals. It is formed by a duplicature of the mediaſtinum, or membrane which divides the thorax into two unequal parts. See ANATOMY, nº 121.

PERICARPIUM, (from περι "round," and καρπὸς "fruit,") the ſeed-veſſel; that organ of a plant containing the ſeeds, which it diſcharges when ripe. The ſeed-veſſel is in fact the developed ſeed-bud, and may very properly be compared to the fecundated ovary in animals; for it does not exiſt till after the fertilizing of the ſeeds by the male-duſt, and the conſequent fall of the flower. All plants, however, are not furniſhed with a ſeed-veſſel; in ſuch as are deprived of it, the receptacle or calyx performs its functions by incloſing the ſeeds, as in a matrix, and accompanying them to perfect maturity.

PERICHORUS, in antiquity, a name given by the Greeks to their profane games or combats, that is, to ſuch as were not conſecrated to any of the gods.

PERICLES, was one of the greateſt men that ever flouriſhed in Greece. He was educated with all imaginable care; and beſide other matters, he had for his tutors Zeno, Eleates, and Anaxagoras. He learned from the laſt of theſe to fear the gods without ſuperſtition, and to account for an eclipſe from a natural cauſe. Many were unjuſt enough to ſuſpect him of atheiſm, becauſe he had perfectly ſtudied the doctrine of that philoſopher. He was a man of undoubted courage; and of ſuch extraordinary eloquence, ſupported and improved by knowledge, that he gained almoſt as great an authority under a republican government as if he had been a monarch; but yet he could not eſcape the ſatirical ſtrokes of the comic poets. His diſſoluteneſs with women was one of the vices with which he was chiefly charged. He died the third year of the Peloponneſian war, after long ſickneſs, which had weakened his underſtanding. Aſpaſia, Pericles's favourite, was a learned woman of Miletus: ſhe taught Socrates rhetoric and politics. As Pericles cared not much for his wife, he willingly gave her up to another, and married Aſpaſia, whom he paſſionately loved.

PERICRANIUM, in *Anatomy*, a thick ſolid coat or membrane covering the outſide of the cranium or ſkull. See ANATOMY, nº 4.

PERIGEE, in *Aſtronomy*, that point of the ſun or moon's orbit wherein they are at the leaſt diſtance from the earth; in which ſenſe it ſtands oppoſed to apogee.

PERIGORD, a province of France, which makes part of Guienne, bounded on the north by Angoumois and a part of Marche, and on the eaſt by Quercy and Limoſin; on the ſouth by Agenois and Bazadois: and on the weſt, by Bourledois, Angoumois, and a part of Saintonge. It is about 83 miles in length, and 60 in breadth. It abounds in iron mines, and the air is pure and healthy. Perigueux is the capital town.

PERIGORD Stone, is ſuppoſed to be an ore of mangeneſe, of a dark grey colour, like baſalt.

PERIGRAPHE, a word uſually underſtood to expreſs a careleſs or inaccurate delineation of any thing; but in Veſalius it is uſed to expreſs the white lines or impreſſions that appear on the muſculus rectus of the abdomen.

PERIGUEUX, an ancient town of France, capital of the province of Perigord, ſeated on the river Iſle, in E. Long. 0. 33. N. Lat. 45. 18. It is remarkable for the ruins of the temple of Venus, and an amphitheatre.

PERIHELIUM, in *Aſtronomy*, that part of a planet or comet's orbit wherein it is in its leaſt diſtance from the ſun; in which ſenſe it ſtands in oppoſition to aphelium.

PERIMETER, in *Geometry*, the bounds or limits of any figure or body. The perimeters of ſurfaces or figures are lines; thoſe of bodies are ſurfaces. In circular figures, inſtead of perimeter, we ſay circumference, or periphery.

PERINÆUM, or PERINEUM, in *Anatomy*, the ſpace between the anus and the parts of generation, divided into two equal lateral diviſions by a very diſtinct line, which is longer in males that in females.

PERIOD, in *Aſtronomy*, the time taken up by a ſtar or planet in making a revolution round the ſun; or the duration of its courſe till it return to the ſame part of its orbit. See PLANET.

The different periods and mean diſtances of the ſeveral planets are as follows:

	Days.	h.	′	″	mean Diſt.
Herſchel	30737	18			1908352
Saturn	10759	1	51	11	954072
Jupiter	4332	14	27	10	520279
Mars	686	23	30	35	152369
Earth	365	6	9	12	100000
Venus	224	16	49	10	72333
Mercury	87	23	15	43	38710

There is a wonderful harmony between the diſtances of the planets from the ſun, and their periods round him; the great law whereof is, that the ſquares of the periodical times of the primary planet, are to each other as the cubes of their diſtances from the ſun: and likewiſe, the ſquares of the periodical times of the ſecondaries of any planet are to each other as the cubes of their diſtances from that primary. This harmony among the planets is one of the greateſt confirmations of the Copernican hypotheſis. See ASTRONOMY, p. 100 and 101.

For the periods of the moon, ſee MOON, ASTRONOMY *Index*.

The periods of ſeveral comets are now pretty well aſcertained. See ASTRONOMY, n° 306.

PERIOD, in *Chronology*, denotes a revolution of a certain number of years, or a ſeries of years, whereby, in different nations, and on different occaſions, time is meaſured; ſuch are the following.

Calippic PERIOD, a ſyſtem of ſeventy-ſix years. See CALIPPIC, and ASTRONOMY, n° 11, &c.

Dionyſian PERIOD, or *Victorian Period*, a ſyſtem of 532 lunæ-ſolar and Julian years; which being elapſed, the characters of the moon fall again upon the ſame day and feria, and revolve in the ſame order, according to the opinion of the ancients.

This period is otherwiſe called the *great paſchal cycle*, becauſe the Chriſtian church firſt uſed it to find the true time of the paſcha or eaſter. The ſum of theſe years ariſes by multiplying together the cycles of the ſun and moon.

Hipparchus's PERIOD, is a ſeries of 304 ſolar years, returning in a conſtant round, and reſtoring the new and full moons to the ſame day of the ſolar year, according to the ſentiment of Hipparchus. This period ariſes by multiplying the Calippic period by four.—Hipparchus aſſumed the quantity of the ſolar year to be 365 days 5 hours 55′ 12″; and hence concluded, that in 104 years Calippus's period would err a whole day. He therefore multiplied the period by four, and from the product caſt away an entire day. But even this does not reſtore the new and full moons to the ſame day throughout the whole period; but they are ſometimes anticipated 1 day 8 hours 23′ 29″ 20‴. See ASTRONOMY, n° 14.

Julian PERIOD. See JULIAN.

PERIOD, in *Grammar*, denotes a ſmall compaſs of diſcourſe, containing a perfect ſentence, and diſtinguiſhed at the end by a point, or full ſtop, thus (.); and in members or diviſions marked by commas, colons, &c.

Father Buffier obſerves two difficulties in the uſe of the period, or point; i. e. in diſtinguiſhing it from the colon, or double point; and in determining juſtly the end of a period, or perfect ſentence. It is remarked, that the ſupernumerary members of a period, ſeparated from the reſt by colons and ſemicolons, uſually commence with a conjunction: yet it is true theſe ſame conjunctions ſometimes rather begin new periods than ſupernumerary members of old ones. It is the ſenſe of things, and the author's own diſcretion, that muſt make the proper diſtinction which of the two in effect it is. No rules will be of any ſervice, unleſs this be admitted as one, that when what follows the conjunction is of as much extent as what precedes it, it is uſually a new period; otherwiſe not.

The ſecond difficulty ariſes hence, that the ſenſe appears perfect in ſeveral ſhort detached phraſes, wherein it does not ſeem there ſhould be periods; a thing frequent in free diſcourſe: as, *We are all in ſuſpenſe: make your propoſals immediately: you will be to blame for detaining us longer*. Where it is evident, that ſimple phraſes have perfect ſenſes like periods, and ought to be marked accordingly; but that the ſhortneſs of the diſcourſe making them eaſily comprehended, the pointing is neglected.

De Colonia defines period a ſhort but perfect ſentence, conſiſting of certain parts or members, depending one on another, and connected together by ſome common vinculum. The celebrated definition of Ariſtotle is, a period is a diſcourſe which has a beginning, a middle, and an end, all viſible at one view. Rhetoricians conſider period, which treats of the ſtructure of ſentences, as one of the four parts of compoſition. The periods allowed in oratory are three: A period of two members, called by the Greeks *dicolos*, and by the Latins *bimembris*; a period of three members, *tricolos*, *trimembris*; and a period of four, *quadrimembris*, *tetracolos*. See PUNCTUATION.

PERIOD, in numbers, is a diſtinction made by a point or comma, after every ſixth place, or figure; and is uſed in numeration, for the readier diſtinguiſhing and naming the ſeveral figures or places; which ſee under NUMERATION.

PERIOD, in *Medicine*, is applied to certain diſeaſes which have intervals, and returns, to denote an entire

Period || Peripatetics.

courſe or circle of ſuch diſeaſe; or its progreſs from any ſtate through all the reſt till it return to the ſame again.

Galen deſcribes period as a time compoſed of an intenſion and remiſſion; whence it is uſually divided into two parts, the paroxyſm or exacerbation, and remiſſion.

In intermitting fevers, the periods are uſually ſtated and regular; in other diſeaſes, as the epilepſy, gout, &c. they are vague or irregular.

Period, in *Oratory*. See there, n° 47.

PERIODIC, or Periodical, ſomething that terminates and comprehends a period; ſuch is a periodic month; being the ſpace of time wherein the moon diſpatches her period.

PERIOECI, περιοικοι, in *Geography*, ſuch inhabitants of the earth as have the ſame latitudes, but oppoſite longitudes, or live under the ſame parallel and the ſame meridian, but in different ſemicircles of that meridian, or in oppoſite points of the parallel. Theſe have the ſame common ſeaſons throughout the year, and the ſame phenomena of the heavenly bodies; but when it is noonday with the one, it is midnight with the other, there being twenty-four hours in an eaſt or weſt direction. Theſe are found on the globe by the hour-index, or by turning the globe half round, that is, 180 degrees either way.

PERIOSTEUM, or Periostium, in *Anatomy*, a nervous vaſcular membrane, endued with a very quick ſenſe, immediately ſurrounding, in every part, both the internal and external ſurfaces of all the bones in the body, excepting only ſo much of the teeth as ſtand above the gums, and the peculiar places on the bones, in which the muſcles are inſerted. It is hence divided into the external and internal perioſteum; and where it externally ſurrounds the bones of the ſkull, it is generally called the *pericranium*. See Anatomy *Index*.

PERIPATETICS, philoſophers, followers of Ariſtotle, and maintainers of the peripatetic philoſophy; called alſo *Ariſtotelians*. Cicero ſays, that Plato left two excellent diſciples, Xenocrates and Ariſtotle, who founded two ſects, which only differed in name: the former took the appellation of *Academics*, who were thoſe that continued to hold their conferences in the Academy, as Plato had done before; the others, who followed Ariſtotle, were called *Peripatetics*, from περιπατεω, "I walk;" becauſe they diſputed walking in the Lyceum.

Ammonius derives the name Peripatetic from Plato himſelf, who only taught walking; and adds, that the diſciples of Ariſtotle, and thoſe of Xenocrates, were equally called Peripatetics; the one Peripatetics of the Academy, the other Peripatetics of the Lyceum: but that in time the former quitted the title Peripatetic for that of Academic, on account of the place where they aſſembled; and the latter retained ſimply that of Peripatetic. The greateſt and beſt part of Ariſtotle's philoſophy was borrowed from Plato. Serranus aſſerts, and ſays he could demonſtrate, that there is nothing exquiſite in any part of Ariſtotle's philoſophy, dialectics, ethics, politics, phyſics, or metaphyſics, but is found in Plato. And of this opinion are many of the ancient authors, ſuch as Clemens Alexandrinus, &c. Gale attempts to ſhow, that Ariſtotle borrowed a good deal of his philoſophy, both phyſical, about the firſt matter, and metaphyſical about the firſt being, his affections, truth, unity, goodneſs, &c. from the Scriptures; and adds from Clearchus, one of Ariſtotle's ſcholars, that he made uſe of a certain Jew, who aſſiſted him therein.

Peripatetics.

Ariſtotle's philoſophy preſerved itſelf *in puris naturalibus* for a long time: in the earlier ages of Chriſtianity, the Platonic philoſophy was generally preferred; but this did not prevent the doctrine of Ariſtotle from forcing its way into the Chriſtian church. Towards the end of the fifth century, it roſe into great credit; the Platonics interpreting in their ſchools ſome of the writings of Ariſtotle, particularly his dialectics, and recommending them to young perſons. This appears to have been the firſt ſtep to that univerſal dominion which Ariſtotle afterwards obtained among the learned, which was at the ſame time much promoted by the controverſies which Origen had occaſioned. This father was zealouſly attached to the Platonic ſyſtem; and therefore, after his condemnation, many, to avoid the imputation of his errors, and to prevent their being counted among the number of his followers, openly adopted the philoſophy of Ariſtotle. Nor was any philoſophy more proper for furniſhing thoſe weapons of ſubtle diſtinctions and captious ſophiſms, which were uſed in the Neſtorian, Arian, and Eutychian controverſies. About the end of the ſixth century, the Ariſtotelian philoſophy, as well as ſcience in general, was almoſt univerſally decried; and it was chiefly owing to Boethius, who explained and recommended it, that it obtained a higher degree of credit among the Latins than it had hitherto enjoyed. Towards the end of the ſeventh century, the Greeks abandoned Plato to the monks, and gave themſelves up entirely to the direction of Ariſtotle; and in the next century, the Peripatetic philoſophy was taught everywhere in their public ſchools, and propagated in all places with conſiderable ſucceſs. John Damaſcenus very much contributed to its credit and influence, by compoſing a conciſe, plain, and comprehenſive view of the doctrines of the Stagirite, for the inſtruction of the more ignorant, and in a manner adapted to common capacities. Under the patronage of Photius, and the protection of Bardas, the ſtudy of philoſophy for ſome time declined, but was revived again about the end of the ninth century. About the middle of the 11th century, a revolution in philoſophy commenced in France; when ſeveral famous logicians, who followed Ariſtotle as their guide, took nevertheleſs the liberty of illuſtrating and modelling anew his philoſophy, and extending it far beyond its ancient limits. In the 12th century, three methods of teaching philoſophy were in uſe by the different doctors: the firſt was the ancient and plain method, which confined its reſearches to the philoſophical notions of Porphyry, and the dialectic ſyſtem, commonly attributed to St Auguſtine, and in which was laid down this general rule, that philoſophical inquiries were to be limited to a ſmall number of ſubjects, leſt by their becoming too extenſive, religion might ſuffer by a profane mixture of human ſubtilty with its divine wiſdom. The ſecond method was called the Ariſtotelian, becauſe it conſiſted in explications of the works of that philoſopher, ſeveral of whoſe books, being tranſlated into Latin, were almoſt everywhere in the hands of the learned. The third was termed the free method, employed by ſuch as were bold enough to ſearch after truth, in the manner the moſt adapted to render their inquiries ſucceſsful, without rejecting the ſuccours of Ariſtotle and Plato. A reformed ſyſtem of the Peripatetic philoſophy was firſt introduced into the ſchools in the univerſity of Paris, from whence it ſoon ſpread throughout Europe; and has ſubſiſted in ſome univerſities even to this day, under the name of *ſchool philoſophy*. The foundation thereof is Ariſtotle's doctrine, often miſunderſtood, but oftener miſapplied: whence the retainers thereto may be denominated *Reformed Peripatetics*. Out of theſe have ſprung, at various times, ſeveral branches; the chief are, the THOMISTS, SCOTISTS, and NOMINALISTS. See theſe articles.

The Peripatetic ſyſtem, after having prevailed with great and extenſive dominion for many centuries, began rapidly to decline towards the cloſe of the 17th, when the diſciples of Ramus attacked it on the one hand, and it had ſtill more formidable adverſaries to encounter in Deſcartes, Gaſſendi, and Newton. See PHILOSOPHY.

PERIPATON, in antiquity, the name of that walk in the Lyceum where Ariſtotle taught, and whence the name of Peripatetics given to his followers.

PERIPETIA, in the drama, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes. See CATASTROPHE.

PERIPHERY, in *Geometry*, the circumference of a circle, ellipſis, or any other regular curvilinear figure. See GEOMETRY.

PERIPHRASIS, circumlocution, formed of περι, "about," and φραζω, "I ſpeak;" in rhetoric, a circuit or tour of words, much affected by orators, to avoid common and trite manners of expreſſion. The periphraſis is of great uſe on ſome occaſions; and it is often neceſſary to make things be conceived which are not proper to name. It is ſometimes polite to ſuppreſs the names, and only intimate or deſign them. Theſe turns of expreſſion are alſo particularly ſerviceable in oratory; for the ſublime admitting of no direct citations, there muſt be a compaſs taken to inſinuate the authors whoſe authority is borrowed. A periphraſis, by turning round a proper name to make it underſtood, amplifies and raiſes the diſcourſe; but care muſt be taken it be not too much ſwelled, nor extended *mal à propos;* in which caſe it becomes flat and languid.—See CIRCUMLOCUTION and ORATORY.

PERIPLOCA, Virginian ſilk: a genus of plants belonging to the pentandria claſs; and in the natural method ranking under the 30th order, *Contortæ*. See BOTANY *Index*.

PERIPNEUMONY, Περιπνευμονια, formed from περι "about," and πνευμων "lungs," in *Medicine*, an inflammation of ſome part of the thorax, properly of the lungs; attended with an acute fever, and a difficulty of breathing. See MEDICINE, n° 184.

PERIRRHANTERIUM, a veſſel of ſtone or braſs which was filled with holy water, and with which all thoſe were ſprinkled who were admitted by the ancients to their ſacrifices. Beyond this veſſel no profane perſon was allowed to paſs. We are told by ſome, that it was placed in the *adytum*, or inmoſt receſs of the temple; others ſay it was placed at the door, which indeed ſeems to be the moſt likely opinion. It was uſed both by Greeks and Romans, and has been evidently borrowed, like many other Pagan ceremonies, by the church of Rome. The Hebrews alſo had a veſſel for purification.

PERISCII, in *Geography*, the inhabitants of either frigid zone, between the polar circles and the poles, where the ſun, when in the ſummer ſigns, moves only round about them, without ſetting; and conſequently their ſhadows in the ſame day turn to all the points of the horizon.

PERISTALTIC, a vermicular ſpontaneous motion of the inteſtines, performed by the contraction of the circular and longitudinal fibres of which the fleſhy coats of the inteſtines are compoſed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the fæces are protruded towards the anus.

PERISTYLE, in *Ancient Architecture*, a building encompaſſed with a row of columns on the inſide.

PERITONÆUM, in *Anatomy*, is a thin, ſmooth, and lubricous membrane, inveſting the whole internal ſurface of the abdomen, and containing moſt of the viſcera of that part as it were in a bag. See ANATOMY *Index*.

PERITROCHIUM, in *Mechanics*, denotes a wheel, or circle, concentric with the baſe of a cylinder, and moveable together with it about its axis. See MECHANICS.

PERJURY, in *Law*, is defined by Sir Edward Coke to be a crime committed when a lawful oath is adminiſtered, in ſome judicial proceeding, to a perſon who ſwears wilfully, abſolutely, and falſely, in a matter material to the iſſue or point in queſtion. In ancient times it was in ſome places puniſhed with death; in others it made the falſe ſwearer liable to the puniſhment due to the crime he had charged the innocent perſon with; in others a pecuniary mulct was impoſed. But though it eſcaped human, yet it was thought, amongſt the ancients in general, that the divine vengeance would moſt certainly overtake it; and there are many ſevere inflictions from the hand of God upon record, as monuments of the abhorrence in which this atrocious crime is held by the Deity. The ſouls of the deceaſed were ſuppoſed to be employed in puniſhing perjured perſons. Even the inanimate creation was thought to take revenge for this crime. The Greeks ſuppoſed that no perſon could ſwear falſely by Styx without ſome remarkable puniſhment; and that no perſon guilty of perjury could enter the cave of Palæmon at Corinth without being made a memorable example of divine juſtice. In Sicily, at the temple of the Palici, there were fountains called *Delli*, from which iſſued boiling water, with flames and balls of fire; and we are told that if any perſon ſwore falſely near them, he was inſtantly ſtruck dumb, blind, lame, or dead, or was ſwallowed up by the waters. But although perjury was thus held in general abhorrence, notwithſtanding the credit which was given to ſuch accounts of divine inflictions, it was ſo much practiſed by the Greeks, that *Græca fides* became a proverb. Lovers perjuries, however, were ſuppoſed to paſs unnoticed, or to be very ſlightly puniſhed with blackneſs of the nails, a decayed tooth, or ſome ſmall diminution of beauty.

The ancient philoſophers, however, were ſo afraid of perjury, that even an oath before a judge was never admitted but for want of other proof. Plato's precept was, "Not to adminiſter an oath wantonly, but on deep grounds, and with the ſtricteſt caution." Ulpian gives his opinion thus: "Some are forward to take oaths from a contempt of religion; others, from an extraordinary awe of the Divine Majeſty, carry their fear to an unreaſonable ſuperſtition; ſo make an equitable deciſion of a judge neceſſary." "No man will perjure himſelf (ſays Ariſtotle) who apprehends vengeance from Heaven and diſgrace among men." Clinias was ſo very ſcrupulous, that rather than take an oath (though lawfully), he ſuffered the loſs of three talents. Perjury, in the time of Philo Judeus, was abominated and capitally puniſhed among the Jews; though ſince they have much degenerated, having been poiſoned with the books of the Talmud, which ſays, "He who breaks his promiſſory oath, or any vows he enters into by the year, if he has a mind that they ſhould be ineffectual and invalid, let him riſe the laſt day of the year, and ſay, Whatever promiſes, oaths, and vows I may think fit to make in the year following, let them be null, void, and of no effect." Tract. iii. part 3. of the *Talmud*, in the treatiſe *Nedharim*, ch. 4. And the modern Jews uſe the ſame artifice, that in general they may then lawfully deceive the Chriſtians. See *H[illegible] de Dolis Talmud*, c. 3. and *Magiſter Joannes de Concor. Legum*, tit. iv. c. 7.

In our law, no notice is taken of any perjury but ſuch as is committed in ſome court of juſtice having power to adminiſter an oath; or before ſome magiſtrate or proper officer inveſted with a ſimilar authority, in ſome proceedings relative to a civil ſuit or a criminal proſecution: for it eſteems all other oaths unneceſſary at leaſt, and therefore will not puniſh the breach of them. For which reaſon it is much to be queſtioned, how far any magiſtrate is juſtifiable in taking a voluntary affidavit in any extrajudicial matter, as is now too frequent upon every petty occaſion: ſince it is more than poſſible that, by ſuch idle oaths, a man may frequently, *in foro conſcientiæ*, incur the guilt, and at the ſame time evade the temporal penalties of perjury. The perjury muſt alſo be corrupt (that is, committed *malo animo*), wilful, poſitive, and abſolute; not upon ſurpriſe, or the like: it alſo muſt be in ſome point material to the queſtion in diſpute; for if it only be in ſome trifling collateral circumſtance, to which no regard is paid, it is no more penal than in the voluntary extrajudicial oaths before mentioned. Subornation of perjury is the offence of procuring another to take ſuch a falſe oath, as conſtitutes perjury in the principal. The puniſhment of perjury and ſubornation, at common law, has been various. It was anciently death: afterwards baniſhment, or cutting out the tongue; then forfeiture of goods; and now it is fine and impriſonment, and never more to be capable of bearing teſtimony. But the ſtatute 5 Eliſ. c. 9. (if the offender be proſecuted thereon) inflicts the penalty of perpetual infamy, and a fine of 40l. on the ſuborner; and in default of payment, impriſonment for ſix months, and to ſtand with both ears nailed to the pillory. Perjury itſelf is thereby puniſhed with ſix months impriſonment, perpetual infamy, and a fine of 20l. or to have both ears nailed to the pillory. But the proſecution is uſually carried on for the offence at common law; eſpecially as, to the penalties before inflicted, the ſtatute 2 Geo. II. c. 25. ſuperadds a power for the court to order the offender to be ſent to the houſe of correction for a term not exceeding ſeven years, or to be tranſported for the ſame period; and makes it felony, without benefit of clergy, to return or eſcape within the time. It has ſometimes been wiſhed, that perjury, at leaſt upon capital accuſations, whereby another's life has been or might have been deſtroyed, was alſo rendered capital, upon a principle of retaliation; as it was univerſally by the laws of France. And certainly the odiouſneſs of the crime pleads ſtrongly in behalf of the French law. But it is to be conſidered, that they admitted witneſſes to be heard only on the ſide of the proſecution, and uſed the rack to extort a confeſſion from the accuſed. In ſuch a conſtitution, therefore, it was neceſſary to throw the dread of capital puniſhment into the other ſcale, in order to keep in awe the witneſſes for the crown; on whom alone the priſoner's fate depended: ſo naturally does one cruel law beget another. But corporal and pecuniary puniſhments, exile, and perpetual infamy, are more ſuited to the genius of the Engliſh law; where the fact is openly diſcuſſed between witneſſes on both ſides, and the evidence for the crown may be contradicted and diſproved by thoſe of the priſoner. Where indeed the death of an innocent perſon has actually been the conſequence of ſuch wilful perjury, it falls within the guilt of deliberate murder, and deſerves an equal puniſhment; which our ancient law in fact inflicted. But the mere attempt to deſtroy life by other means not being capital, there is no reaſon that an attempt by perjury ſhould; much leſs that this crime ſhould, in all judicial caſes, be puniſhed with death. For to multiply capital puniſhments leſſens their effect, when applied to crimes of the deepeſt dye; and, deteſtable as perjury is, it is not by any means to be compared with ſome other offences, for which only death can be inflicted; and therefore it ſeems already (except perhaps in the inſtance of deliberate murder by perjury) very properly puniſhed by our preſent law; which has adopted the opinion of Cicero, derived from the law of the twelve tables, *Perjurii pœna divina, exitium; humana, dedecus*. See OATH.

PERIWIG. See PERRUKE.

PERIZONIUS, JAMES, a learned and laborious writer, was born at Dam in 1651. He became profeſſor of hiſtory and eloquence at the univerſity of Franeker, when, by his merit and learning, he made that univerſity flouriſh. However, in 1693, he went to Leyden, where he was made profeſſor of hiſtory, eloquence, and the Greek tongue; in which employment he continued till his death, which happened in 1715. He wrote many Diſſertations, and other learned and curious works, particularly *Origines Babylonicæ et Ægyptiacæ*, 2 vols 8vo, &c. But the part of his labours which is the moſt generally known, and perhaps the moſt uſeful, is the notes which he wrote upon *Sanctii Minerva*. That work, as publiſhed by Perizonius, certainly ſuggeſted the idea of Harris's Hermes; and we heſitate not to ſay, that our countryman has made hardly any improvement on the ſyſtem of his maſter.

PERIZZITES, the ancient inhabitants of Paleſtine, mingled with the Canaanites. There is alſo great probability that they themſelves were Canaanites; but having no fixed habitations, ſometimes diſperſed in one country and ſometimes in another, they were for that reaſon called *Perizzites*, which ſignifies *ſcattered* or *diſperſed*. *Pherazeth* ſtands for *hamlets* or *villages*. The Perizzites did not inhabit any certain portion of the land of Canaan; there were ſome of them on both ſides the river Jordan, in the mountains, and in the plains. In ſeveral places of Scripture the Canaanites and Perizzites are mentioned as the two chief people of the country. It is ſaid, for example, that in the time of Abraham and Lot the Canaanite and Perizzite were in the land (Gen. xiii. 7.). The Iſraelites of the tribe of Ephraim complained to Joſhua that they were too much pent up in their poſſeſſion (Joſh. xvii. 15.): he bid them go, if they pleaſed, into the mountains of the Perizzites, and Rephaims or giants, and there clearing the land, to cultivate and inhabit it. Solomon ſubdued the remains of the Canaanites and Perizzites which the children of Iſrael had not rooted out, and made them tributary to him (1 Kings ix. 20, 21. and 2 Chr. viii. 7.). There is ſtill mention made of the Perizzites in the time of Ezra (ix. 1.), after the return from the captivity of Babylon; and ſeveral Iſraelites had married wives from that nation.

PERKIN, a beverage prepared from pears. See CYDERKIN, under AGRICULTURE, N° 656.

PERMEABLE, a term applied to bodies of ſo looſe a texture as to let ſomething paſs through them.

PERMSKI, or PERMIA, a town of the Ruſſian empire, and capital of a province of the ſame name, ſeated on the river Kama between the Dwina and the Oby; E. Long. 55. 50. N. Lat. 70. 26. The province is bounded on the north by the Samoiedes, on the weſt by Zirania and Ulatka, and on the eaſt by Siberia.

PERMUTATION, in *Commerce*, the ſame with bartering. In the canon-law, permutation denotes the actual exchange of one benefice for another.

PERNAMBUCO, a province of Brazil, in South America, bounded on the north by Tamera, on the eaſt by the ocean, on the ſouth by Seregippa, and on the weſt by Tapuyers. It is about 200 miles in length and 150 in breadth. The Dutch became maſters of it in 1630, but the Portugueſe ſoon after retook it. It produces a great quantity of ſugar, cotton, and the beſt Brazil wood.

PERNIO, a kibe or chilblain, is a little ulcer, occaſioned by cold in the hands, feet, heels, noſe, and lips. It will come on when warm parts are too ſuddenly expoſed to cold, or when parts from being too cold are ſuddenly expoſed to a conſiderable warmth; and has always a tendency to gangrene, in which it frequently terminates. It moſt commonly attacks children of a ſanguine habit and delicate conſtitution; and may be prevented or removed by ſuch remedies as invigorate the ſyſtem, and are capable of removing any tendency to gangrene in the conſtitution.

PERONÆUS, in *Anatomy*, is an epithet applied to ſome of the muſcles of the perone or fibula. See ANATOMY, *Table of the Muſcles*.

PERONES, a ſort of high ſhoes which were worn not only by country people, but by men of ordinary rank at Rome. In the early times of the commonwealth they were worn even by ſenators; but at laſt they were diſuſed by perſons of figure, and confined to ploughmen and labourers. They were very rudely formed, conſiſting only of hides undreſſed, and reaching to the middle of the leg. Virgil mentions the perones as worn by a company of ruſtic ſoldiers on one foot only.

PERONNE, a ſtrong town of France, in Picardy, capital of Santerre. It is ſaid never to have been taken, though often beſieged. It is ſeated on the river Somme, in E. Long. 3. 1. N. Lat. 44. 50.

PERORATION, in *Rhetoric*, the epilogue or laſt part of an oration, wherein what the orator had inſiſted on through his whole diſcourſe is urged afreſh with greater vehemence and paſſion. The peroration conſiſts of two parts. 1. Recapitulation; wherein the ſubſtance of what was diffuſed throughout the whole ſpeech is collected briefly and curſorily, and ſummed up with new force and weight. 2. The moving the paſſions; which is ſo peculiar to the peroration, that the maſters of the art call this part *ſedes affectuum*. The paſſions to be raiſed are various, according to the various kinds of oration. In a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear. The qualities required in the peroration are, that it be very vehement and paſſionate, and that it be ſhort; becauſe, as Cicero obſerves, tears ſoon dry up. Theſe qualities were well obſerved by Cicero, who never had an equal in the management of this part of an orator's province; for peroration was his maſterpiece.

"Concerning peroration (ſays Dr Blair), it is needleſs to ſay much, becauſe it muſt vary ſo conſiderably, according to the ſtrain of the preceding diſcourſe. Sometimes the whole pathetic part comes in moſt properly at the peroration. Sometimes, when the diſcourſe has been entirely argumentative, it is fit to conclude with ſumming up the arguments, placing them in one view, and leaving the impreſſion of them full and ſtrong on the mind of the audience. For the great rule of a concluſion, and what nature obviouſly ſuggeſts, is, to place that laſt on which we chooſe that the ſtrength of our caſe ſhould reſt.

"In all diſcourſes, it is a matter of importance to hit the preciſe time of concluding, ſo as to bring our diſcourſe juſt to a point; neither ending abruptly and unexpectedly, nor diſappointing the expectation of the hearers when they look for the cloſe, and continuing to hover round and round the concluſion till they become heartily tired of us. We ſhould endeavour to get off with a good grace; not to end with a languiſhing and drawling ſentence, but to cloſe with dignity and ſpirit, that we may leave the minds of the hearers warm, and diſmiſs them with a favourable impreſſion of the ſubject and of the ſpeaker."

PEROTIS, a genus of plants belonging to the triandria claſs, and in the natural method ranking under the 4th order, *Gramina*. See BOTANY *Index*.

PERPENDICULAR, in *Geometry*, a line falling directly on another line, ſo as to make equal angles on each ſide. See GEOMETRY.

PERPETUAL, ſomething that endures always, or laſts for ever.

PERPETUAL Motion. See MOVEMENT.

PERPIGNAN, a conſiderable town of Rouſillon, in France, with a ſtrong citadel, an univerſity, and a biſhop's ſee. It is ſeated on the river Tet; over which there is a handſome bridge. E. Long. 0. 43. N. Lat. 45. 16.

PERQUISITE, in a general ſenſe, ſomething gained by a place over and above the ſettled wages.

Perquisite, in *Law*, is any thing gotten by a man's own induſtry, or purchaſed with his money; in contradiſtinction to what deſcends to him from his father or other anceſtor.

PERRAULT, Claude, the ſon of an advocate in parliament, was born at Paris in 1613; and was bred a phyſician, though he never practiſed but among his relations, friends, and the poor. He diſcovered early a particular taſte for the ſciences and fine arts; of which he acquired a conſummate knowledge without the aſſiſtance of a maſter: he excelled in architecture, painting, ſculpture, mathematics, phyſics, and all thoſe arts that relate to deſigning and mechanics. The entrance into the Louvre, which was deſigned by him, is, according to the judgement of Voltaire, one of the moſt auguſt monuments of architecture in the world. M. Colbert put him upon tranſlating Vitruvius into French; which he performed, and publiſhed it in 1673, folio, with figures from his own drawings; which are ſaid to have been more exactly finiſhed than the plates themſelves. When the academy of ſciences was eſtabliſhed, he was one of its firſt members, and was chiefly depended on for mechanics and natural philoſophy. His works are, *Memoires pour ſervir à l'Hiſtoire naturelle des Animaux*, folio, 1676, with figures; *Eſſais de Phyſique*, 4 vols. 12mo, 1688; *Recueil des pluſieurs machines de nouvelle invention*, 4to, 1700, &c. He died in 1688.

Perrault, *Charles*, the brother of Claude, was born at Paris in 1626, with as great a genius for arts, and a greater for letters, than his brother. Colbert choſe him firſt clerk of the buildings, of which he was ſuperintendant, and afterward made him comptroller-general of the finances under him. He was one of the firſt members of the academy of the belles lettres and inſcriptions, and was received into the French academy in 1671. His poem, *La Peinture*, printed in 1688, was univerſally admired: that entitled *La ſiecle de Louis le Grand*, in which he exalted the modern authors above the ancient, was a prelude to a war with all the learned. After he had diſengaged himſelf from this conteſt, he applied himſelf to draw up elogies of ſeveral great men of the 17th century, with their portraits, of which he has collected 102. There are other eſteemed works of Perrault.—Beſides theſe there were two other brothers, *Peter* and *Nicholas*, who made themſelves known in the literary world.

PERRON, James Davy du, a cardinal, diſtinguiſhed by his abilities and learning, was born in the canton of Bern in 1556. He was educated by Julian Davy, his father, a learned Calviniſt, who taught him Latin and the mathematics; after which, he by himſelf became acquainted with the Greek and Hebrew, philoſophy, and the poets. Philip Deſportes, abbot of Tyron, made him known to Henry III. king of France, who conceived a great eſteem for him. Some time after, Du Perron abjured Calviniſm, and afterwards embraced the eccleſiaſtical function; and having given great proofs of his wit and learning, he was choſen to pronounce the funeral oration of Mary queen of Scots. After the murder of Henry III. he retired to the houſe of Cardinal de Bourbon, and took great pains in bringing back the Proteſtants to the church of Rome. Among others he gained over Henry Spondanus, afterwards biſhop of Pamiers. He alſo chiefly contributed to engage Henry IV. to change his religion, and that prince ſent him to negotiate his reconciliation to the holy ſee, in which he ſucceeded. Du Perron was conferred biſhop of Evreaux while he reſided at Rome. On his return to France, he wrote, preached, and diſputed againſt the reformed; particularly againſt Du Pleſſis Mornay, with whom he had a public conference in the preſence of the king at Fontainbleau. He was made cardinal in 1604 by Pope Clement VIII. at the ſolicitation of Henry IV. who afterwards nominated him to the archbiſhopric of Sens. The king at length ſent him to Rome with Cardinal Joyeuſe, in order to terminate the diſputes which had ariſen between Paul V. and the Venetians. It is ſaid that this pope had ſuch a high opinion of the addreſs of the cardinal Du Perron, that he uſed to ſay, "Let us pray to God to inſpire the cardinal Du Perron, for he will perſuade us to do whatever he pleaſes." After the death of Henry IV. he retired into the country, where he put the laſt hand to his work; and, ſetting up a printing-houſe, corrected every ſheet himſelf. He died at Paris in 1618. His works were collected after his death, and publiſhed at Paris in 3 vols. folio.

PERROT, Nicholas, Sieur d'Ablancourt, one of the firſt geniuſes of his age, was born at Chalons in 1606. After ſtudying philoſophy about three years, he was ſent to Paris to follow the law. At eighteen years of age he was admitted advocate of parliament, and frequented the bar; but he ſoon conceived a diſtaſte for it, and therefore diſcontinued his practice. This diſpleaſed an uncle, but whoſe favour he recovered by quitting the Proteſtant religion. He could not however, be prevailed upon to take orders in the Romiſh church; and ſome years after, he had a deſire to return to the religion he had abjured. But, that he might not do any thing raſhly, he reſolved to ſtudy philoſophy and divinity. For that purpoſe he choſe for his maſter Mr Stuart a Scotſman and Lutheran, a man of great learning. Almoſt three years he ſpent in the moſt aſſiduous ſtudy; and then ſet out from Paris to Champagne, where he abjured the Roman Catholic, and once more embraced the Proteſtant religion. In 1637 he was admitted a member of the French academy; a little after which he undertook a tranſlation of Tacitus. Whilſt he was engaged in that laborious taſk, he retired to his ſmall eſtate of Ablancourt, and lived there till his death in 1664. He was a man of fine underſtanding, of great piety and integrity, and of univerſal learning. Moreri has given a catalogue of his works, the greateſt part of which conſiſt of tranſlations, which ſeemed rather originals.

PERRUKE, Peruke, or *Periwig*, was anciently a name for a long head of natural hair; ſuch, particularly, as there was care taken in the adjuſting and trimming of. Menage derives the word rather fancifully from the Latin *pilus* "hair." It is derived, according to this critic, thus, *pilus*, *pelus*, *pelutus*, *pelutícus*, *pelutica*, *perutica*, *peruca*, *perruque*. The Latins called it *coma*: whence part of Gaul took the denomination of *Gallia Comata*, from the long hair which the inhabitants wore as a ſign of freedom. An ancient author ſays, that Abſalom's peruke weighed 200 ſhekels.

The word is now uſed for a ſet of falſe hair, curled, buckled, and ſewed together on a frame or cawl; an-

Perruke, Perry.

ciently called *capillamentum* or "falſe perruke." It is doubted whether or not the uſe of perrukes of this kind was known among the ancients. It is true, they uſed falſe hair. Martial and Juvenal make merry with the women of their time, for making themſelves look young with their borrowed hair; with the men who changed their colours according to the ſeaſons; and with the dotards, who hoped to deceive the Deſtinies by their white hair. But theſe ſeem to have ſcarce had any thing in common with our perrukes; and were at beſt only compoſed of hair painted, and glued together. Nothing can be more ridiculous than the deſcription Lampridius gives of the emperor Commodus's perruke: it was powdered with ſcrapings of gold, and oiled (if we may uſe the expreſſion) with glutinous perfumes for the powder to hang by. In effect, the uſe of perrukes, at leaſt in their preſent mode, is not much more than 160 years old; the year 1629 is reckoned the epocha of long perrukes, at which time they began to appear in Paris; from whence they ſpread by degrees through the reſt of Europe. At firſt it was reputed a ſcandal for young people to wear them, becauſe the loſs of their hair at that age was attributed to a diſeaſe the very name whereof is a reproach; but at length the mode prevailed over the ſcruple, and perſons of all ages and conditions have worn them, foregoing without any neceſſity the conveniences of their natural hair. It was, however, ſome time before the eccleſiaſtics came into the faſhion: the firſt who aſſumed the perruke were ſome of the French clergy, in the year 1660; nor is the practice yet well authorized. Cardinal Grimaldi in 1684, and the biſhop of Lavaur in 1688, prohibited the uſe of the perruke to all prieſts without a diſpenſation or neceſſity. M. Thiers has an expreſs treatiſe, to prove the perruke indecent in an eccleſiaſtic, and directly contrary to the decrees and canons of councils. A prieſt's head, embelliſhed with artificial hair curiouſly adjuſted, he eſteems a monſter in the church; nor can he conceive any thing ſo ſcandalous as an abbot with a florid countenance, heightened with a well-curled perruke.

PERRY, Captain John, was a famous engineer, who reſided long in Ruſſia, having been recommended to the czar Peter while in England, as a perſon capable of ſerving him on a variety of occaſions relating to his new deſign of eſtabliſhing a fleet, making his rivers navigable, &c. His ſalary in this ſervice was 300l. per annum, beſides travelling expences and ſubſiſtence money on whatever ſervice he ſhould be employed, together with a further reward to his ſatisfaction at the concluſion of any work he ſhould finiſh. After ſome converſation with the czar himſelf, particularly reſpecting a communication between the rivers Volga and Don, he was employed on that work for three ſummers ſucceſſively; but not being well ſupplied with men, partly on account of the ill ſucceſs of the czar's arms againſt the Swedes at the battle of Narva, and partly by the diſcouragement of the governor of Aſtracan, he was ordered at the end of 1707 to ſtop, and next year was employed in refitting the ſhips at Veroniſe, and 1709 in making the river of that name navigable; but after repeated diſappointments, and a variety of fruitleſs applications for his ſalary, he at laſt quitted the kingdom, under the protection of Mr Whitworth, the Engliſh ambaſſador, in 1712: (See his narrative in the Preface to *The State of Ruſſia*). In 1721 he was employed in ſtopping with ſucceſs the breach at Dagenham, in which ſeveral other undertakers had failed; and the ſame year about the harbour at Dublin, to the objections againſt which he then publiſhed an Anſwer. He was author of The State of Ruſſia, 1716, 8vo, and An Account of the ſtopping of Dagenham Breach, 1721, 8vo; and died Feb. 11. 1733.

Perry, Perſecution.

PERRY, the name of a very pleaſant and wholeſome liquor extracted from pears, in the ſame manner as cyder is from apples. See Cyder and Agriculture *Index*.

The beſt pears for perry, or at leaſt the ſorts which have been hitherto deemed the fitteſt for making this liquor, are of a tart and harſh quality. Of theſe the Boſbury pear, the Bareland pear, and the horſe pear, are the moſt eſteemed for perry in Worceſterſhire, and the ſquaſh pear, as it is called, in Glouceſterſhire; in both which counties, as well as in ſome of the adjacent parts, they are planted in the hedge-rows and moſt common fields. There is this advantage attending pear-trees, that they will thrive on land where apples will not ſo much as live, and that ſome of them grow to ſuch a ſize, that a ſingle pear-tree, particularly of the Boſbury and the ſquaſh kind, has frequently been known to yield, in one ſeaſon, from one to four hogſheads of perry. The Boſbury pear is thought to yield the moſt laſting and moſt vinous liquor. The John pear, the Harpary pear, the Drake pear, the Mary pear, the Lullum pear, and ſeveral others of the harſheſt kinds, are eſteemed the beſt for perry, but the redder or more tawney they are, the more they are preferred. Pears, as well as apples, ſhould be full ripe before they are ground.

Dr Beale, in his general advertiſements concerning cyder, ſubjoined to Mr Evelyn's Pomona, diſapproves of Palladius's ſaying, that perry will keep during the winter, but that it turns ſour as ſoon as the weather begins to be warm; and gives, as his reaſons for being of a contrary opinion, that he had himſelf taſted at the end of ſummer, a very briſk, lively, and vinous liquor, made of horſe pears; that he had often tried the juice of the Boſbury pear, and found it both pleaſanter and richer the ſecond year, and ſtill more ſo the third, though kept only in common hogſheads, and in but indifferent cellars, without being bottled; and that a very honeſt, worthy, and ingenious gentleman in his neighbourhood, aſſured him, as of his own experience, that it will keep a great while, and grow much the ſtronger for keeping, if put into a good cellar and managed with due care. He imputes Palladius's error to his poſſibly ſpeaking of common eatable pears, and to the perry's having been made in a very hot country: but he would have aſcribed it to a more real cauſe, perhaps, had be pointed out the want of a thorough regular fermentation, to which it appears plainly that the ancients were entire ſtrangers; for all their vinous liquors were medicated by boiling before they were laid up in order to be kept.

PERSECUTION, is any pain or affliction which a perſon deſignedly inflicts upon another; and in a more reſtrained ſenſe, the ſufferings of Chriſtians on account of their religion.

Hiſtorians uſually reckon ten general perſecutions, the firſt of which was under the emperor Nero, 31 years after our Lord's aſcenſion; when that emperor having

Perſecution, Perſees.

ſet fire to the city of Rome, threw the odium of that execrable action on the Chriſtians, who under that pretence were wrapped up in the ſkins of wild beaſts, and worried and devoured by dogs; others were crucified, and others burnt alive. The ſecond was under Domitian, in the year 95. In this perſecution St John the apoſtle was ſent to the iſle of Patmos, in order to be employed in digging in the mines. The third began in the third year of Trajan, in the year 100, and was carried on with great violence for ſeveral years. The fourth was under Antoninus the philoſopher, when the Chriſtians were baniſhed from their houſes, forbidden to ſhow their heads, reproached, beaten, hurried from place to place, plundered, impriſoned, and ſtoned. The fifth began in the year 197, under the emperor Severus. The ſixth began with the reign of the emperor Maximinus in 235. The ſeventh, which was the moſt dreadful perſecution that had ever been known in the church, began in the year 250, in the reign of the emperor Decius, when the Chriſtians were in all places driven from their habitations, ſtripped of their eſtates, tormented with racks, &c. The eighth began in the year 257, in the fourth year of the reign of the emperor Valerian. The ninth was under the emperor Aurelian, A. D. 274; but this was very inconſiderable: and the tenth began in the 19th year of Diocleſian, A. D. 303. In this dreadful perſecution, which laſted ten years, houſes filled with Chriſtians were ſet on fire, and whole droves were tied together with ropes and thrown into the ſea. See TOLERATION.

PERSEES, the deſcendants of a colony of ancient Perſians, who took refuge at Bombay, Surat, and in the vicinity of thoſe cities, when their own country was conquered 1100 years ago by the Mahometan Arabs. They are a gentle, quiet, and induſtrious people, loved by the Hindoos, and living in great harmony among themſelves. The conſequence is, that they multiply exceedingly, whilſt their countrymen in the province of Keman are viſibly diminiſhing under the yoke of the Mahometan Perſians. Of the manners and cuſtoms of this amiable race, we have the following account in Heron's elegant tranſlation of Niebuhr's Travel's.

" The Perſees (ſays he) make common contributions for the aid of their poor, and ſuffer none of their number to aſk alms from people of a different religion. They are equally ready to employ their money and credit to ſcreen a brother of their fraternity from the abuſes of juſtice. When a Perſee behaves ill, he is expelled from their communion. They apply to trade, and exerciſe all ſorts of profeſſions.

" The Perſees have as little knowledge of circumciſion as the Hindoos. Among them, a man marries only one wife, nor ever takes a ſecond, unleſs when the firſt happens to be barren. They give their children in marriage at ſix years of age; but the young couple continue to live ſeparate, in the houſes of their parents, till they attain the age of puberty. Their dreſs is the ſame as that of the Hindoos, except that they wear under each ear a tuft of hair, like the modern Perſians. They are much addicted to aſtrology, although very little ſkilled in aſtronomy.

" They retain the ſingular cuſtom of expoſing their dead to be eaten by birds of prey, inſtead of interring or burning them. I ſaw (continues our author) on a hill at Bombay a round tower, covered with planks of wood, on which the Perſees lay out their dead bodies. When the fleſh is devoured, they remove the bones into two chambers at the bottom of the tower.

" The Perſees, followers of the religion of Zerduſt or Zoroaſter, adore one God only, eternal and almighty. They pay, however, a certain worſhip to the ſun, the moon, the ſtars, and to fire, as viſible images of the inviſible divinity. Their veneration for the element of fire induces them to keep a ſacred fire conſtantly burning, which they feed with odoriferous wood, both in the temples and in the houſes of private perſons, who are in eaſy circumſtances. In one of their temples at Bombay, I ſaw a fire which had burnt unextinguiſhed for two centuries. They never blow out a light, leſt their breath ſhould ſoil the purity of the fire. See POLYTHEISM.

" The religion of the Perſees enjoins purifications as ſtrictly as that of the Hindoos. The diſciples of Zerduſt are not, however, obliged to abſtain from animal food. They have accuſtomed themſelves to refrain from the fleſh of the ox, becauſe their anceſtors promiſed the Indian prince who received them into his dominions never to kill horned cattle. This promiſe they continue to obſerve under the dominion of Chriſtians and Mahometans. The horſe is by them conſidered as the moſt impure of all animals, and regarded with extreme averſion.

" Their feſtivals, denominated *Ghumbars*, which return frequently, and laſt upon each occaſion five days, are all commemorations of ſome part of the work of creation. They celebrate them not with ſplendour, or with any particular ceremonies, but only dreſs better during thoſe five days, perform ſome acts of devotion in their houſes, and viſit their friends."

The Perſees were till lately but very little known: the ancients ſpeak of them but ſeldom, and what they ſay ſeems to be dictated by prejudice. On this account Dr Hyde, who thought the ſubject both curious and intereſting, about the end of the 17th century attempted a deeper inveſtigation of a ſubject which till then had been but very little attended to. He applied to the works of Arabian and Perſian authors, from whom, and from the relations of travellers, together with a variety of letters from perſons in India, he compiled his celebrated work on the religion of the Perſees. Other accounts have been given by different men, as accident put information in their way. But the moſt diſtinguiſhed is by M. Anquetil du Perron, who undertook a voyage to diſcover and tranſlate the works attributed to Zoroaſter. Of this voyage he drew up an account himſelf, and read it before the Royal Academy of Sciences at Paris in May 1761. A tranſlation of it was made and publiſhed in the Gentleman's Magazine for 1762, to which we refer our readers. The account begins at page 373, and is concluded at page 614. Remarks were afterwards made on Du Perron's account by a Mr Yates. See the ſame Magazine for 1766, p. 529.

PERSEPOLIS, formerly the capital of Perſia, ſituated in N. Lat. 30. 30. E. Long. 84. 0. now in ruins, but remarkable for the moſt magnificent remains of a palace or temple that are to be found throughout the world.—This city ſtood in one of the fineſt plains in Perſia, being 18 or 19 leagues in length, and in ſome

Plate CCCCIX.

places two, in ſome four, and in others ſix leagues in breadth. It is watered by the great river Araxes, now Bendemir, and by a multitude of rivulets beſides. Within the compaſs of this plain, there are between 1000 and 1500 villages, without reckoning thoſe in the mountains, all adorned with pleaſant gardens, and planted with ſhady trees. The entrance of this plain on the weſt ſide has received as much grandeur from nature, as the city it covers could do from induſtry or art. It conſiſts of a range of mountains ſteep and high, four leagues in length, and about two miles broad, forming two flat banks, with a riſing terrace in the middle, the ſummit of which is perfectly plain and even, all of native rock. In this there are ſuch openings, and the terraces are ſo fine and ſo even, that one would be tempted to think the whole the work of art, if the great extent, and prodigious elevation thereof, did not convince one that it is a wonder too great for aught but nature to produce. Undoubtedly theſe banks were the very place where the advanced guards from Perſepolis took poſt, and from which Alexander found it ſo difficult to diſlodge them. One cannot from hence deſcry the ruins of the city, becauſe the banks are too high to be overlooked; but one can perceive on every ſide the ruins of walls and of edifices, which heretofore adorned the range of mountains of which we are ſpeaking. On the weſt and on the north this city is defended in the like manner: ſo that, conſidering the height and evenneſs of theſe banks, one may ſafely ſay, that there is not in the world a place ſo fortified by nature.

The mountain Rehumut, in the form of an amphitheatre, encircles the palace, which is one of the nobleſt and moſt beautiful pieces of architecture remaining of all antiquity. Authors and travellers have been exceedingly minute in their deſcriptions of thoſe ruins; and yet ſome of them have expreſſed themſelves ſo differently from others, that, had they not agreed with reſpect to the latitude and longitude of the place, one would be tempted to ſuſpect that they had viſited different ruins. Theſe ruins have been deſcribed by Gercias de Silva Figueroa, Pietro de la Valle, Chardin, Le Brun, and Mr Francklin. We ſhall adopt the deſcription of an intelligent traveller. The aſcent to the columns is by a grand ſtaircaſe of blue ſtone containing 104 ſteps.

"The firſt object that ſtrikes the beholder on his entrance, are two portals of ſtone, about 50 feet in height each; the ſides are embelliſhed with two ſphinxes of an immenſe ſize, dreſſed out with a profuſion of bead-work, and, contrary to the uſual method, they are repreſented ſtanding. On the ſides above are inſcriptions in an ancient character, the meaning of which no one hitherto has been able to decypher.

"At a ſmall diſtance from theſe portals you aſcend another flight of ſteps, which lead to the grand hall of columns. The ſides of this ſtaircaſe are ornamented with a variety of figures in baſſo relievo; moſt of them have veſſels in their hands: here and there a camel appears, and at other times a kind of triumphal car, made after the Roman faſhion; beſides theſe are ſeveral led horſes, oxen, and rams, that at times intervene and diverſify the proceſſion. At the head of the ſtaircaſe is another baſſo relievo, repreſenting a lion ſeizing a bull; and cloſe to this are other inſcriptions in ancient characters. On getting to the top of this ſtaircaſe, you enter what was formerly a moſt magnificent hall; the natives have given this the name of *chehul minar*, or forty pillars; and though this name is often uſed to expreſs the whole of the building, it is more particularly appropriated to this part of it. Although a vaſt number of ages have elapſed ſince the foundation, 15 of the columns yet remain entire; they are from 70 to 80 feet in height, and are maſterly pieces of maſonry: their pedeſtals are curiouſly worked, and appear little injured by the hand of time. The ſhafts are enfluted up to the top, and the capitals are adorned with a profuſion of fretwork.

"From this hall you proceed along eaſtward, until you arrive at the remains of a large ſquare building, to which you enter through a door of granite. Moſt of the doors and windows of this apartment are ſtill ſtanding; they are of black marble, and poliſhed like a mirror: on the ſides of the doors, at the entrance, are bas-reliefs of two figures at full length; they repreſent a man in the attitude of ſtabbing a goat: with one hand he ſeizes hold of the animal by the horn, and thruſts a dagger into his belly with the other; one of the goat's feet reſts upon the breaſt of the man, and the other upon his right arm. This device is common throughout the palace. Over another door of the ſame apartment is a repreſentation of two men at full length; behind them ſtands a domeſtic holding a ſpread umbrella: they are ſupported by large round ſtaffs, appear to be in years, have long beards, and a profuſion of hair upon their heads.

"At the ſouth-weſt entrance of this apartment are two large pillars of ſtone, upon which are carved four figures; they are dreſſed in long garments, and hold in their hands ſpears 10 feet in length. At this entrance alſo the remains of a ſtaircaſe of blue ſtone are ſtill viſible. Vaſt numbers of broken pieces of pillars, ſhafts, and capitals, are ſcattered over a conſiderable extent of ground, ſome of them of ſuch enormous ſize, that it is wonderful to think how they could have been brought whole, and ſet up together. Indeed, every remains of theſe noble ruins indicate their former grandeur and magnificence, truly worthy of being the reſidence of a great and powerful monarch."

Theſe noble ruins are now the ſhelter of beaſts and birds of prey. Beſides the inſcriptions above mentioned, there are others in Arabic, Perſian, and Greek. Dr Hyde obſerves, that the inſcriptions are very rude and clumſy; and that ſome, if not all of them, are in praiſe of Alexander the Great; and therefore are later than that conqueror. See the article RUINS.

PERSEVERANCE, in *Theology*, a continuance in a ſtate of grace to a ſtate of glory.

About this ſubject there has been much controverſy in the Chriſtian church. All divines, except Unitarians, admit, that no man can be ever in a ſtate of grace without the co-operation of the ſpirit of God; but the Calviniſts and Arminians differ widely as to the nature of this co-operation. The former, at leaſt ſuch as call themſelves the *true diſciples of Calvin*, believe, that thoſe who are once under the influence of divine grace can never fall totally from it, or die in mortal ſin. The Arminians, on the other hand, contend, that the whole of this life is a ſtate of probation; that without the grace of God we can do nothing that is good; that the Holy Spirit aſſiſts, but does not overpower, our natural faculties; and that a man, at any period of his life, may reſiſt, grieve, and even quench, the ſpirit. See THEOLOGY.

PERSEUS was the moſt ancient of all the Greek heroes. He founded the city of Mycenæ, of which he became afterwards king, and where he and his poſterity reigned for 100 years. He flouriſhed, according to moſt chronologiſts, 1348 B. C.; but, according to Sir Iſaac Newton, only 1028.

PERSEUS. See ASTRONOMY *Index*.

1
Extent of Perſia.

PERSIA, a moſt ancient and celebrated empire of Aſia, extending in length from the mouth of the river Araxes to that of the river Indus, about 1840 of our miles, and in breadth from the river Oxus, to the Perſian gulf, about 1080 of the ſame miles. It is bounded on the north by the Caſpian ſea, the river Oxus, and Mount Caucaſus; on the eaſt, by the river Indus and the dominions of the Great Mogul; on the ſouth, by the Perſian gulf and the Indian ocean; and on the weſt, by the dominions of the Grand Signior.

2
Perſia properly the name of only one province of this vaſt empire.

We learn from Sir William Jones, the illuſtrious preſident of the Aſiatic Society, that Perſia is the name of only one province of this extenſive empire, which by the preſent natives, and all the learned *Muſſulmans* who reſide in the Britiſh territories in India, is called *Iràn*. It has been a practice not uncommon in all ages to denominate the whole of a country from that part of it with which we are beſt acquainted; and hence have the Europeans agreed to call Iràn by the name of that province of which Shirauz is the capital: See SHIRAUZ. The ſame learned writer is confident that Iràn, or Perſia in its largeſt extent, comprehended within its outline the lower Aſia, which, ſays he, was unqueſtionably a part of the *Perſian*, if not of the old Aſſyrian empire. "Thus may we look on Iràn as the nobleſt peninſula on this habitable globe; and if M. Bailly had fixed on it as the *Atlantis* of PLATO, he might have ſupported his opinion with far ſtronger arguments than any that he has adduced in favour of *Nova Zembla*. If, indeed, the account of the Atlantis be not purely an Egyptian fable, I ſhould be more inclined, ſays Sir William, to place them in Iràn than in any region with which I am acquainted."

3
Various names of the country.

The moſt ancient name, however, of this country was that of *Elam*, or, as ſome write it, *Ælam*, from Elam the ſon of Shem, from whom its firſt inhabitants are deſcended. Herodotus calls its inhabitants *Cephenes*; and in very ancient times the people are ſaid to have called themſelves *Artæi*, and the country where they dwelt *Artæa*. In the books of Daniel, Eſdras, &c. it is called by the names of *Pars*, *Pharas*, or *Fars*, whence the modern name of *Perſia*; but whence thoſe names have been derived, is now uncertain.

4
Opinions reſpecting its firſt population.

That Perſia was originally peopled by Elam the ſon of Shem, has been very generally admitted; but the truth is, that of the ancient hiſtory of this diſtinguiſhed empire very little is perfectly known. For this ignorance, which at firſt ſeems ſtrange, ſatisfactory reaſons may eaſily be aſſigned; of which the principal are the ſuperficial knowledge of the *Greeks* and *Jews*, and the loſs of Perſian archives or hiſtorical compoſitions. "That the Grecian writers before XENOPHON had *no* acquaintance with *Perſia*, and that their accounts of it are wholly fabulous, is a paradox too extravagant to be ſeriouſly mentioned; but (ſays Sir William Jones) their connection with it in war or peace had been generally confined to bordering kingdoms under feudatory princes; and the firſt *Perſian* emperor, whoſe life and character they ſeem to have known with tolerable accuracy, was the great CYRUS." Our learned author, however, is ſo far from conſidering Cyrus as the firſt Perſian monarch, that he thinks it evident a powerful monarchy had ſubſiſted in Iràn for ages before the acceſſion of that hero; that this monarchy was called the *Mahébédian* dynaſty; and that it was in fact the oldeſt monarchy in the world. The evidence upon which the preſident reſts this opinion, is the work of a Mahometan traveller, compiled from the books of ſuch Perſians as fled from their country upon the innovation in religion made by Zoroaſter: and if theſe books, of which a few ſtill remain, be genuine, and the Mahometan a faithful compiler, facts of which Sir William has not the ſmalleſt doubt, the evidence is certainly ſufficient to bear the ſuperſtructure which he has raiſed upon it.

5
Perhaps the original ſeat of the human race.

If the Perſian monarchy was thus ancient, it is natural to ſuppoſe that Perſia or Iràn was the original ſeat of the human race, whence colonies were ſent out or emigrated of themſelves to people the reſt of the habitable globe. This ſuppoſition is actually made by our ingenious author, who ſtrongly confirms it by remarks on the moſt ancient language of Perſia, which he ſhows to have been the parent of the *Sanſcrit*, as well as of the Greek, Latin, and Gothic (ſee PHILOLOGY). He therefore holds, as a propoſition firmly eſtabliſhed, "that *Iràn* or Perſia, in its largeſt ſenſe, was the true centre of population, of knowledge, of languages, and of arts; which inſtead of travelling weſtward only, as it has been fancifully ſuppoſed, or eaſtward, as might with equal reaſon have been aſſerted, were expanded in all directions to all the regions of the world." He thinks it is from good authority that the Saxon Chronicle brings the firſt inhabitants of Britain from Armenia; that the Goths have been concluded to come from Perſia; and that both the Iriſh and old Britons have been ſuppoſed to have proceeded from the borders of the Caſpian: for all theſe places were comprehended within the ancient Iràn.

6
Accounts of the birth, &c. of Cyrus.

Of this firſt Perſian monarchy we have no hiſtorical accounts; and muſt therefore, after having thus mentioned it, deſcend at once to the era of Cyrus. This prince is celebrated both by ſacred and profane hiſtorians; but the latter are at no ſmall variance concerning his birth and acceſſion to the throne. According to Herodotus, Aſtyages, the laſt king of the Medes, being warned in a dream, that the ſon who was to be born of his daughter Mandane, ſhould one day be lord of Aſia, reſolved to marry her, not to a Mede, but to a Perſian. Accordingly he choſe for her huſband one Cambyſes, a man of a peaceable diſpoſition, and of no very high ſtation. However, about a year after they were married, Aſtyages was frightened by another dream, which made him reſolve to diſpatch the infant as ſoon as it ſhould be born. Hereupon the king ſent for his daughter, and put her under confinement, where ſhe was ſoon after delivered of a ſon. The infant was committed to the care of one Harpagus, with ſtrict orders to deſtroy it in what manner he thought proper. But he, having acquainted his wife with the command he had received, by her advice gave it to a ſhepherd, deſiring him to let it periſh by expoſing it. But the ſhepherd, out of compaſſion, expoſed a ſtill-born child which his wife happened to be then delivered of, and brought up the ſon of Mandane as his own, giving him the name of Cyrus.

When the young prince had attained the age of ten years, as he was one day at play with other children of the ſame age, he was choſen king by his companions; and having, in virtue of that dignity, divided them into ſeveral orders and claſſes, the ſon of Artembares, a lord of eminent dignity among the Medes, refuſed to obey his orders; whereupon Cyrus cauſed him to be ſeized, and whipped very ſeverely. The boy ran crying to his father; and he immediately haſtened to the king's palace, loudly complaining of the affront his ſon had received from the ſon of a ſlave, and intreating Aſtyages to revenge, by ſome exemplary puniſhment, the indignity offered to him and his family. Aſtyages, commanding both the herdſman and his ſon to be brought before him, aſked the latter, how he, who was the ſon of ſo mean a man, had dared to abuſe the ſon of one of the chief lords of the kingdom? Cyrus replied, that he had done no more than he had a right to do; for the boys of the neighbourhood having choſen him king, becauſe they thought him moſt worthy of that dignity, and performed what he, veſted with that character, had commanded, the ſon of Artembares alone had ſlighted his orders, and for his diſobedience had ſuffered the puniſhment he deſerved. In the courſe of this converſation Aſtyages happening to recollect, that his grandſon, whom he had ordered to be deſtroyed, would have been about the ſame age with Cyrus, began to queſtion the ſhepherd concerning his ſuppoſed ſon, and at laſt obtained from him a confeſſion of the whole truth.

Aſtyages having now diſcovered Cyrus to be his grandſon, ſent for Harpagus, who alſo confeſſed that he had not ſeen Mandane's ſon deſtroyed, but had given him to the ſhepherd; at which Aſtyages was ſo much incenſed, that, having invited Harpagus to an entertainment, he cauſed him to be ſerved with the fleſh of his own ſon. When he had done, the king aſked him whether he liked his victuals; and Harpagus anſwering, that he had never taſted any thing more delicious, the officers appointed for that purpoſe brought in a baſket, containing the head, hands, and feet of his ſon, deſiring him to uncover the baſket, and take what he liked beſt. He did as they deſired, and beheld the mangled remains of his only child without betraying the leaſt concern, ſo great was the command which he had over his paſſions. The king then aſked him, whether he knew with what kind of meat he had been entertained. Harpagus replied, that he knew very well, and was always pleaſed with what his ſovereign thought fit to ordain; and having thus replied, with a ſurpriſing temper he collected the mangled parts of his innocent ſon, and went home.

Aſtyages having thus vented his rage on Harpagus, began next to conſult what he ſhould do with Cyrus. The magi, however, eaſed him of his fears with regard to him, by aſſuring him, that as the boy had been once choſen king by his companions, the dream had been already verified, and that Cyrus never would reign in any other ſenſe. The king, being well pleaſed with this anſwer, called Cyrus and, owning how much he had been wanting in the affection which he ought to have had towards him, deſired him to prepare for a journey into Perſia, where he would find his father and mother in circumſtances very different from thoſe of the poor ſhepherd and his wife with whom he had hitherto lived. Cyrus, on his arrival at his father's houſe, was received with the greateſt joy. When he grew up, he ſoon became popular on account of his extraordinary parts; till at laſt his friendſhip was courted by Harpagus, who had never forgot the cruel treatment he received from Aſtyages. By his means a conſpiracy was formed againſt Aſtyages; who being overthrown in two ſucceſſive engagements, was taken priſoner and confined for life.

The account given by Xenophon of the riſe of Cyrus is much more conſonant to Scripture; for he tells us, that Babylon was conquered by the united forces of the Medes and Perſians. According to him, Cyrus was the ſon of Cambyſes king of the Medes, and Mandane the daughter of Aſtyages king of Perſia. He was born a year after his uncle Cyaxares, the brother of Mandane. He lived till the age of twelve with his parents in Perſia, being educated after the manner of the country, and inured to fatigues and military exerciſes. At this age he was taken to the court of Aſtyages, where he reſided four years; when the revolt of the Medes and Perſians from the Babylonians happened, and which ended in the deſtruction of the Babyloniſh empire, as related under the article Babylon.

7
His war with the Lydians.

While Cyrus was employed in the Babyloniſh war, before he attacked the metropolis itſelf, he reduced all the nations of Aſia Minor. The moſt formidable of theſe were the Lydians, whoſe king Crœſus aſſembled a very numerous army, compoſed of all the other nations in that part of Aſia, as well as of Egyptians, Greeks, and Thracians. Cyrus being informed of theſe vaſt preparations, augmented his forces to 196,000 men, and with them advanced againſt the enemy, who were aſſembled near the river Pactolus. After long marches, he came up with them at Thymbra, not far from Sardis, the capital of Lydia. Beſides the horſe and foot, which amounted to 196,000, as already obſerved, Cyrus had 300 chariots armed with ſcythes, each chariot drawn by four horſes abreaſt, covered with trappings that were proof againſt all ſorts of miſſive weapons; he had likewiſe a great number of chariots of a larger ſize, upon each of which was placed a tower about 18 or 20 feet high, and in each tower were lodged 20 archers. Theſe towers were drawn by 16 oxen yoked abreaſt. There was moreover a conſiderable number of camels, each mounted by two Arabian archers, the one looking towards the head, and the other towards the hinder part of the camel. The army of Crœſus conſiſted of 420,000 men. The Egyptians, who alone were 120,000 in number, being the main ſtrength of the army, were placed in the centre. Both armies were drawn up in an immenſe plain, which gave room for the extending of the wings on either ſide; and the deſign of Crœſus, upon which alone he founded his hopes of victory, was to ſurround and hem in the enemy's army.

8
The battle of Thymbra.

When the two armies were in ſight of each other, Crœſus, obſerving how much his front exceeded that of Cyrus, made the centre halt, but commanded the two wings to advance, with a deſign to incloſe the Perſian army, and begin the attack on both ſides at once. When the two detached bodies of the Lydian forces were ſufficiently extended, Crœſus gave the ſignal to the main body, which marched up to the front of the Perſian army, while the two wings attacked them in flank; ſo that Cyrus's army was hemmed in on all ſides, and, as Xenophon expreſſes it, was incloſed like a ſmall ſquare drawn within a great one. This motion, however, did not at all alarm the Perſian commander; but, giving his troops the ſignal to face about, he attacked in flank thoſe forces that were going to fall upon his rear ſo vigorouſly, that he put them into great diſorder. At the ſame time a ſquadron of camels was made to advance againſt the enemy's other wing, which conſiſted moſtly of cavalry. The horſes were ſo frightened at the approach of theſe animals, that moſt of them threw their riders, and trod them under foot; which occaſioned great confuſion. Then Artageſes, an officer of great valour and experience, at the head of a ſmall body of horſe, charged them ſo briſkly, that they could never afterwards rally; and at the ſame time the chariots, armed with ſcythes, being driven in among them, they were entirely routed. Both the enemy's wings being thus put to flight, Cyrus commanded his chief favourite Abradates to fall upon the centre with the large chariots above mentioned. The firſt ranks, conſiſting moſtly of Lydians, not being able to ſtand ſo violent a charge, immediately gave way; but the Egyptians, being covered with their bucklers, and marching ſo cloſe that the chariots had not room to penetrate their ranks, a great ſlaughter of the Perſians enſued. Abradates himſelf was killed, his chariot overturned, and the greateſt part of his men were cut in pieces. Upon his death, the Egyptians, advancing boldly, obliged the Perſian infantry to give way, and drove them back quite to their engines. There they met with a new ſhower of darts and javelins from their machines; and at the ſame time the Perſian rear advancing ſword in hand, obliged their ſpearmen and archers to return to the charge. In the mean time Cyrus, having put to flight both the horſe and foot on the left of the Egyptians, puſhed on to the centre, where he had the misfortune to find his Perſians again giving ground; and judging that the only way to ſtop the Egyptians, who were purſuing them, would be to attack them in the rear, he did ſo; and at the ſame time the Perſian cavalry coming up to his aſſiſtance, the fight was renewed with great ſlaughter on both ſides. Cyrus himſelf was in great danger; for his horſe being killed under him, he fell among the midſt of his enemies: but the Perſians, alarmed at the danger of their general, threw themſelves headlong on their opponents, reſcued him, and made a terrible ſlaughter; till at laſt Cyrus, admiring the valour of the Egyptians, offered them honourable conditions: letting them know at the ſame time, that all their allies had abandoned them. They accepted the terms offered them; and having agreed with Cyrus that they ſhould not be obliged to carry arms againſt Crœſus, they engaged in the ſervice of the conqueror, and continued faithful to him ever after.

9
Sardis ta-
en, and
he Lydian
mpire
er-
thrown.

The next morning Cyrus advanced towards Sardis, and Crœſus marched out to oppoſe him at the head of the Lydians only; for his allies had all abandoned him. Their ſtrength conſiſted moſtly in cavalry; which Cyrus being well appriſed of, he ordered his camels to advance; by whom the horſes were ſo frightened, that they became quite ungovernable. However, the Lydians diſmounted, and for ſome time made a vigorous reſiſtance on foot; but were at laſt driven into the city, which was taken two days after; and thus the Lydian empire was totally deſtroyed.

10
Babylon taken.

After the conqueſt of Sardis, Cyrus turned his arms againſt Babylon itſelf, which he reduced in the manner related under that article. Having ſettled the civil government of the conquered kingdoms, Cyrus took a review of all his forces, which he found to conſiſt of 600,000 foot, 120,000 horſe, and 2000 chariots armed with ſcythes. With theſe he extended his dominions all over the nations to the confines of Ethiopia, and to the Red ſea; after which he continued to reign peaceably over his vaſt empire till his death, which happened about 529 before Chriſt. According to Xenophon, he died a natural death; but others tell us, that, having engaged in a war with the Scythians, he was by them overthrown and cut in pieces with his whole army, amounting to 200,000 men. But this is very improbable, ſeeing all authors agree that the tomb of Cyrus was extant at Paſargada in Perſia in the time of Alexander the Great; which it could not have been if his body had remained in the poſſeſſion of the Scythians, as theſe authors aſſert.

11
His death.

In the time of Cyrus, the Perſian empire extended from the river Indus to the Ægean ſea. On the north it was bounded by the Euxine and Caſpian ſeas, and on the ſouth by Ethiopia and Arabia. That monarch kept his reſidence for the ſeven cold months at Babylon, by reaſon of the warmth of that climate; three months in the ſpring he ſpent at Suſa, and two at Ecbatan during the heat of ſummer. On his deathbed he appointed his ſon Cambyſes to ſucceed him in the empire; and to his other ſon, Smerdis, he gave ſeveral conſiderable governments. The new monarch immediately ſet about the conqueſt of Egypt; which he accompliſhed in the manner related in the hiſtory of that country.

12
Cambyſes
conquers
Egypt.

Having reduced Egypt, Cambyſes next reſolved to turn his arms againſt the Carthaginians, Hammonians, and Ethiopians. But he was obliged to drop the firſt of theſe enterpriſes, becauſe the Phœnicians refuſed to ſupply him with ſhips againſt the Carthaginians, who where a Phœnician colony. However, he ſent ambaſſadors into Ethiopia with a deſign to get intelligence of the ſtate and ſtrength of the country. But the Ethiopian monarch, being well appriſed of the errand on which they came, treated them with great contempt. In return for the preſents ſent him by Cambyſes, he ſent his own bow; and adviſed the Perſians to make war upon the Ethiopians when they could bend ſuch a ſtrong bow as eaſily as he did, and to thank the gods that the Ethiopians had no ambition to extend their dominions beyond their own country.

13
His mad ex-
pedition
againſt
Ethiopia
and
Hammon.

Cambyſes was no ſooner informed of this anſwer by his ambaſſadors than he flew into a violent paſſion; and ordered his army immediately to begin their march, without conſidering that they were neither furniſhed with proviſions nor any other neceſſary. When he arrived at Thebes in Upper Egypt, he detached 50,000 men, with orders to deſtroy the temple of Jupiter Ammon: but all theſe periſhed in the deſert; not a ſingle perſon arriving either at the oracle, or returning to Thebes. The reſt of the army, led by Cambyſes himſelf, experienced incredible hardſhips; for, not being provided with any neceſſaries, they had not marched a fifth part of the way when they were obliged to kill and eat their beaſts of burthen. When theſe failed, the ſoldiers fed on graſs and roots, as long as any could be found; and at laſt were reduced to the dreadful neceſſity of eating one another; every tenth man, on whom the lot fell, being condemned to ſerve as food for his companions. The king, however, obſtinately perſiſted in his deſign; till, being apprehenſive of the danger he himſelf was in, he retreated to Thebes, after having loſt the greateſt part of his army.

14 He murders his brother.

Cambyſes was a man of a very cruel and ſuſpicious temper, of which he gave many inſtances; and the following proved indirectly the cauſe of his death.—We have already obſerved that the king of Ethiopia ſent his bow in return for the preſents brought to him by the ambaſſadors of Cambyſes. The only man in the Perſian army who could bend this bow was Smerdis the king's brother; and this inſtance of his perſonal ſtrength ſo alarmed the tyrant, that, without any crime alleged, he cauſed him to be murdered. This gave occaſion to one Smerdis, a magian, who greatly reſembled the other Smerdis in looks, to aſſume the name of the deceaſed prince, and to raiſe a rebellion againſt Cambyſes, who was generally hated for his cruelty; and this he could the more eaſily do, as the chief management of affairs had been committed to this Smerdis during the king's abſence. Cambyſes, on receiving the news of this revolt, immediately ordered his army to march, in order to ſuppreſs it; but as he was mounting his horſe, his ſword, ſlipping out of its ſcabbard, wounded him in the thigh. On this accident, he aſked the name of the city where he was; and being told that it was Ecbatan, he ſaid in the preſence of all his attendants, "Fate has decreed that Cambyſes the ſon of Cyrus ſhall die in this place." For, having conſulted the oracle of Butus, which was very famous in that country, he was told that he ſhould die at Ecbatan. This he had always underſtood of Ecbatan in Media, and had therefore reſolved to avoid it. Being now, however, convinced that his end approached, he aſſembled the chief Perſian lords who ſerved in the army, and having told them that his brother was certainly dead, he exhorted them never to ſubmit to the impoſtor, or ſuffer the ſovereignty again to paſs from the Perſians to the Medes, to which nation Smerdis belonged, but to uſe their utmoſt endeavours to place one of their own blood on the throne.

15 His death.

As the king's wound mortified, he lived but a few days after this; but the aſſembly ſuppoſing that he had ſpoken only out of hatred to his brother, quietly ſubmitted to the impoſtor, who was thus for a time eſtabliſhed on the throne. Indeed, from his conduct during the ſhort time which he enjoyed the kingdom, he appears to have been not at all undeſerving of a crown.

16 Reign of Smerdis the magian.

He began with granting to all his ſubjects an exemption from taxes and military ſervice for three years, and treated all of them in the moſt beneficent manner. To ſecure himſelf on the throne the more effectually, he married Atoſſa the daughter of Cyrus; thinking, that in caſe of a diſcovery he might hold the empire by her title. She had before been married to her brother Cambyſes, on a deciſion of the magi that a king of Perſia might do as he pleaſed; and by virtue of this deciſion Smerdis alſo married her as her brother. The extreme caution of Smerdis, however, promoted the diſcovery of his impoſture. He had married all his predeceſſor's wives, among whom was one Phedyma, the daughter of Otanes a Perſian nobleman of the firſt rank.

17 His impoſture diſc vered.

Otanes, who ſuſpected that the king was not Smerdis the ſon of Cyrus, ſent a truſty meſſenger to his daughter, deſiring to know whether he was ſo or not; but Phedyma, having never ſeen this Smerdis, could not give any anſwer. Her father then deſired her to inquire at Atoſſa, who could not but know her own brother. However, he was again diſappointed; for Phedyma acquainted him that all the king's wives were lodged in diſtinct and ſeparate apartments, without being allowed to ſee each other. This greatly increaſed the ſuſpicions of Otanes; upon which he ſent his daughter a third meſſage, deſiring her, the next time ſhe ſhould be admitted to the king's bed, to take an opportunity of feeling whether he had ears or not: for Cyrus had formerly cauſed the ears of Smerdis the magian to be cut off for ſome crime of which he had been guilty; ſo that, if the king had ears, ſhe might then be aſſured that he was Smerdis the ſon of Cyrus. The event ſhowed that the ſuſpicions of Otanes were juſt; and Phedyma having acquainted her father that the king had no ears, a conſpiracy was immediately formed againſt him.

18 A conſpiracy forme againſt him.

While the conſpirators were debating about the proper means of carrying their deſigns into execution, Darius the ſon of Hyſtaſpes happening to arrive at Suſa where his father was governor, they all agreed to make him privy to their deſign. He told them, at their firſt meeting, that he thought nobody in the empire but himſelf had known that Smerdis the ſon of Cyrus was dead, and the throne uſurped by one of the magi; that he had come with a deſign to kill the uſurper, without imparting his deſign to any one, that the glory of ſuch an action might be entirely his own. But ſince others were appriſed of the impoſture, he inſiſted that the uſurper ſhould be diſpatched without delay. Otanes, on the other hand, was for putting off the enterpriſe till ſome better opportunity offered; but Darius proteſted, that if they did not make the attempt that very day, he would prevent any one from accuſing him, by diſcloſing the whole matter to the impoſtor himſelf.

In the mean time, Smerdis and his brother had by great promiſes prevailed on Prenaſpes (the executioner of the true Smerdis) to bind himſelf by an oath not to diſcover the fraud they had put on the Perſians, and even to make a public ſpeech, declaring that the preſent king of Perſia was really the ſon of Cyrus. At the time appointed, he began his diſcourſe with the genealogy of Cyrus, putting his hearers in mind of the great favours the nation had received from that prince. After having extolled Cyrus and his family, to the great aſtoniſhment of all preſent, he confeſſed the whole tranſaction with regard to the death of Smerdis; telling the people, that the apprehenſions of the danger he muſt inevitably run by publiſhing the impoſture had conſtrained him to conceal it ſo long; but now, not being able any longer to act ſuch a diſhonourable part, he acknowledged that he had been compelled by Cambyſes to put his brother to death with his own hand, and that the perſon who poſſeſſed the throne was Smerdis the magian. He then begged pardon of the gods and men for the crime he had committed; and fulminating many imprecations againſt the Perſians if they failed to recover

ver the ſovereignty, he threw himſelf headlong from the top of the tower on which he ſtood, and died on the ſpot.

19 is kil-

In the mean time the conſpirators, who were advancing towards the palace, were informed of what had happened; and Otanes was again for deferring the execution of their enterpriſe: but Darius inſiſting upon the danger of delay, they proceeded boldly to the palace; and being admitted by the guards, who did not ſuſpect them, they killed both the uſurper and his brother; after which they expoſed their heads to the people, and declared the whole impoſture. The Perſians at this were ſo enraged, that they fell on the whole ſect, and killed every one of the magi they could meet with; and had not the ſlaughter been ſtopped by night, not one of the order would have been left alive. The day on which this ſlaughter happened was afterwards celebrated by the Perſians with the greateſt ſolemnity, and called by the name of *Magophonia*, or *the ſlaughter of the Magi*. On that feſtival the magi durſt not appear abroad, but were obliged to ſhut themſelves up in their houſes. Smerdis the magian reigned only eight months.

When the tumult was a little ſubſided, the conſpirators, who were ſeven in number, met together in order to elect a new king, or to determine what form of government they ſhould next introduce. Otanes was for a republic; but being overruled by the reſt, he declared, that as he was determined not to be a king, neither would he be ruled by one; and therefore inſiſted that he and his family ſhould ever afterwards remain free from ſubjection to the royal power. This was not only granted, but it was further agreed by the other ſix, that whoever was choſen ſhould every year preſent Otanes with a Median veſt, a mark of great diſtinction among the Perſians, becauſe he had been the chief author of the enterpriſe. They further agreed to meet at a certain place next morning at ſunriſe on horſeback, and that he whoſe horſe firſt neighed ſhould be king. This being overheard by Oebores, who had the care of Darius's horſes, he led a mare over-night to the place, and brought his maſter's horſe to her. The next morning, the horſe remembering the place, immediately neighed for the mare; and the five lords diſmounting, ſaluted Darius as their king.

20 arius Hy- ſpes cho- a king.

Darius Hyſtaſpes was elected king of Perſia in the year 522 B. C. Immediately after his acceſſion, he promoted the other ſix conſpirators to the firſt employments in the kingdom, married the two daughters of Cyrus, Atoſſa and Artyſtona, Parmys the daughter of the true Smerdis, and Phedyma the daughter of Otanes, who had detected the impoſture of the magian. He then divided the whole empire into 20 ſatrapies or governments, and appointed a governor over each diviſion, ordering them to pay him an annual tribute. The inhabitants of Colchis, with ſome others, were enjoined only to make annual preſents, and the Arabians to furniſh every year ſuch a quantity of frankincenſe as equalled the weight of 1000 talents. Thus Darius received the yearly tribute of 14,560 Eubœic talents, upwards of 260,000 pounds ſterling.

Under Darius, the building of the temple of Jeruſalem, which had been obſtructed by Cambyſes and Smerdis, went on ſucceſsfully, and the Jewiſh ſtate was entirely reſtored. The moſt remarkable of Darius's other tranſactions were his expeditions againſt Babylon; againſt Scythia, India, and Greece. The expedition againſt Babylon took place in the year 517 B. C. when the people, unable to bear the oppreſſion of the Perſians, and likewiſe diſcontented becauſe the ſeat of government was removed from their city to Suſa in Perſia, took the opportunity of the troubles which happened in the reigns of Cambyſes and Smerdis, to ſtore their city with all kinds of proviſions ſufficient to ſerve them for many years; after which they broke out into an open rebellion, and this quickly brought upon them Darius with all his forces. The Babylonians perceiving themſelves ſhut up by ſo numerous an army, turned all their thoughts towards the ſupporting of a long ſiege, which they imagined would tire out the king's troops. To prevent the conſumption of their proviſions, they took the moſt barbarous and cruel reſolution that ever was put in execution by any nation. They agreed among themſelves to get rid of all unneceſſary mouths; and therefore, gathering together all the old men, women, and children, they ſtrangled them without diſtinction; every one being allowed only to keep the wife he liked beſt, and a maid-ſervant to do the work of the houſe. The ſiege continued for a year and eight months; nor was there any likelihood of its being ended, when Zopyrus, one of Darius's chief commanders, put him in poſſeſſion of it by the following ſtratagem. He cut off his noſe and ears, and having mangled his body with ſtripes in a moſt cruel manner, he fled to the Babylonians thus disfigured, pretending that he had been ſo treated by Darius for adviſing him to raiſe the ſiege. Being intruſted with the command of ſome forces, he cut off ſeveral parties of the Perſian army, whom Darius thus ſacrificed in order to raiſe the character of Zopyrus the higher among the Babylonians. In this manner he ſo much eſtabliſhed his credit, that at laſt he was made commander in chief of all the Babyloniſh forces, and the guard of the city committed entirely to his care; and no ſooner was this done than he delivered it up to Darius, who, to prevent their rebelling a ſecond time, beat down the walls of that metropolis to the height of 50 cubits. Three thouſand of the moſt active in the rebellion were impaled; the reſt pardoned. As they had deſtroyed moſt of their women, the neighbouring nations were commanded to furniſh them with wives, and 50,000 women were ſent to that city, by which means it was prevented from being depopulated. Zopyrus was rewarded with the higheſt honours, and had the whole revenues of Babylon beſtowed on him for life.

21 Revolt of the Babylonians.

23 His unſucceſsful expedition againſt the Scythians.

After the reduction of Babylon, Darius undertook a Scythian expedition, directed againſt thoſe nations which lie between the Danube and the Tanais. His pretext for this war was, to revenge the calamities which these nations had brought upon Aſia about 120 years before, when they invaded and ſubdued Media; keeping it in ſubjection for the ſpace of 28 years, as we have related under that article. In this expedition he was attended with an army of 700,000 men. With theſe he marched to the Thracian Boſphorus; which having paſſed on a bridge of boats, he reduced all Thrace. From Thrace he advanced to the Danube, where he had appointed his fleet to meet him. This river he paſſed on another bridge of boats, and entered Scythia. His enemies, however, were too wiſe to oppoſe ſuch a formidable power in the open field; and therefore retired before him, waſting the country as they went along, till at laſt the king, ſenſible of the danger he was in, reſolved to give over the enterpriſe and return home. In order to do ſo with ſafety, he lighted a great number of fires in the night-time, and decamped; leaving behind him the old men and the ſick, who fell into the hands of their enemies. The Scythians perceiving that Darius was gone, detached a conſiderable body to the bridge over the Danube; and as they were well acquainted with the roads, they got thither before the Perſians. The Scythians had ſent expreſſes before-hand to perſuade the Ionians, whom Darius had left to guard the bridge, to break it down and retire to their own country; and this they preſſed the more earneſtly, that as the time preſcribed by Darius was now expired, they were at liberty to return home, without breaking their word or being wanting in their duty. Miltiades, prince of the Cherſoneſus of Thrace, was for embracing ſo favourable an opportunity of cutting off Darius's retreat, and ſhaking off the Perſian yoke at once: all the other commanders agreed with him, except Hyſtiæus prince of Miletus; who repreſented to the Ionian chiefs, that their power was connected with that of Darius, ſince it was under his protection that each of them was lord in his own city; and that the cities of Ionia would not fail to depoſe them and recover their liberty, if the Perſian power ſhould ſink or decline. This ſpeech made a deep impreſſion on the reſt, and it was at laſt determined that they ſhould wait for Darius; and in order to deceive the Scythians, they began to break down the bridge, but adviſed them to return back and defeat Darius. They did ſo, but miſſed him; and he having thus ſafely eſcaped ſo great a danger, immediately repaſſed the Boſphorus, and took up his winter quarters at Sardis, leaving Megabyzus, one of his chief generals, to complete the conqueſt of Thrace.

23
He conquers India.

The king having ſufficiently refreſhed his troops who had ſuffered extremely in the Scythian expedition, began to think of extending his dominions eaſtward; and in order to facilitate his deſign, reſolved in the firſt place to diſcover thoſe countries. With this view, he cauſed a fleet to be built and equipped at Caſpatyrus, a city on the river Indus. The command of this fleet he gave to one Scylax, a Grecian of Caryandia a city of Caria, who was well verſed in maritime affairs. Him he ordered to ſail down the current, and make the beſt diſcoveries he could of the countries lying on either ſide of the river, till he arrived at the ſouthern ocean; from whence he was to ſteer his courſe weſtward, and that way return to Perſia. Scylax, having exactly obſerved his inſtructions, and ſailed down the river Indus, entered the Red ſea by the ſtraits of Babelmandel, and on the 30th month from his firſt ſetting out, landed at the ſame place from whence Nechu king of Egypt formerly ſent out the Phœnicians who circumnavigated Africa. From hence Scylax returned to Suſa, where he gave a full account of his diſcoveries; upon which Darius, marching into India at the head of a powerful army, reduced that large country, and made it a province of the Perſian empire, drawing from thence an annual tribute of 360 talents of gold.

24
Revolt of the Ionians, &c.

Soon after the expedition of Darius againſt India happened the revolt of the Ionians, which gave occaſion to his expedition into Greece; an account of which is given under the articles ATTICA, GREECE, SPARTA, &c. The ill ſucceſs which attended him here, however, was ſo far from making him drop the enterpriſe, that it only made him the more intent on reducing the Grecians; and he reſolved to head his army in perſon, having attributed his former bad ſucceſs to the inexperience of his generals. But while he was employed in making the neceſſary preparations for this purpoſe, he received intelligence that the Egyptians had revolted, ſo that he was obliged to make preparations for reducing them alſo; and before this could be done, the king died, after having reigned 36 years, leaving the throne to his ſon Xerxes.

25
Expedit
of Xerxe
againſt
Egypt a
Greece.

This prince aſcended the throne of Perſia in the year 485 B. C.; and his firſt enterpriſe was to reduce the Egyptians; which he effectually did, bringing them into a worſe ſtate of ſlavery than they ever had experienced before. After this he reſolved on an expedition into Greece; the unfortunate event of which is related under the article ATTICA. By his misfortunes in the Grecian expedition, he became at laſt ſo diſpirited, that he thenceforth abandoned all thoughts of war and conqueſts; but growing tyrannical, and oppreſſing his ſubjects, he was murdered in his bed, in the year 464 B. C. and 21ſt of his reign; and was ſucceeded by his third ſon Artaxerxes, ſurnamed *Longimanus* on account of the great length of his arms.

26
Xerxes ſu
ceeded b
Artaxerx
Longima
nus.

This prince is named *Ahaſuerus* in Scripture, and is the ſame who married Eſther, and during the whole of his reign ſhowed the greateſt kindneſs to the Jewiſh nation. In the beginning of his reign he was oppoſed by Hyſtaſpes the ſecond ſon of Xerxes, whom, however, he overcame, though not without conſiderable difficulty. After this he applied himſelf to the ſettlement of the affairs of government, and reforming many abuſes which had crept in; and then, being fully eſtabliſhed on the throne, he appointed feaſts and rejoicings to be made for 180 days in the city of Suſa; at one of which he reſolved to divorce his queen for diſobedience; and afterwards married Eſther, as we find it recorded in the ſacred writings.

In the fifth year of the reign of Artaxerxes the Egyptians revolted anew, and, being aſſiſted by the Athenians, held out for ſix years; but were again obliged to ſubmit, and continued in ſubjection during the whole of his reign. Nothing elſe remarkable happened during the life of Artaxerxes Longimanus, who died in the 41ſt year of his reign; and was ſucceeded by Xerxes II. the only ſon he had by his queen, though by his concubines he had 17. Xerxes having drunk immoderately at an entertainment immediately after his acceſſion, retired to a chamber in order to refreſh himſelf with ſleep; but here he was murdered by Sogdianus, the ſon of Artaxerxes by one of his concubines, after he had reigned 45 days.

27
Xerxes II

28
Sogdiano

Sogdianus was ſcarce ſeated on the throne when he put to death Bagorazus, the moſt faithful of all his father's eunuchs; by which, and the murder of his ſovereign, he became generally odious. Upon this, ſenſible of the dangerous ſituation in which he was, he ſent for one of his brothers named *Ochus*, whom he ſuſpected, with a deſign to murder him the moment he arrived. Ochus, however, underſtanding his deſign, put off, by ſeveral pretences, his coming, till he had drawn together a powerful army, with which he advanced to the confines of Perſia. Here he openly declared, that his deſign was to revenge his brother's death; which brought over to

29
Ochus.

to him many of the nobility and governors of provinces, by whom he was immediately proclaimed king. Sogdianus, ſeeing himſelf thus deſerted, contrary to the advice of all his friends, came to an accommodation with Ochus; who no ſooner had him in his power than he cauſed him to be ſuffocated among aſhes; a puniſhment invented on purpoſe for him.

Ochus being firmly ſettled on the throne by the death of Sogdianus, changed his name to Darius; and is by hiſtorians commonly called *Darius Nothus*, or *The Baſtard*. But Arſites, another of the brothers, ſeeing in what manner Sogdianus had got the better of Xerxes, and been afterwards driven out by Ochus, began to entertain thoughts of treating him in the ſame manner. He was not, however, ſo ſucceſsful; for, being defeated in an engagement, he ſurrendered himſelf in hopes of mercy, but was immediately put to death by ſuffocation in aſhes. Several other perſons were executed: but theſe ſeverities did not procure him the repoſe which he expected; for his whole reign was diſturbed with violent commotions in various parts of the empire. One of the moſt dangerous was raiſed by Piſuthna governor of Lydia; but he being deſerted by his Greek mercenaries, was at laſt overcome, and put to death: however, his ſon Amorgas continued to infeſt the maritime provinces of Aſia Minor for two years; till he alſo was taken priſoner by Tiſſaphernes, the new governor of Lydia, who put him to death. Other inſurrections quickly followed this: but the greateſt misfortune which befel Darius during the whole courſe of his reign was the revolt of the Egyptians, who could not be reduced. Before his death he inveſted Cyrus his youngeſt ſon with the ſupreme government of all the provinces of Aſia Minor. This was done through the perſuaſions of his mother Paryſatis, who had an abſolute ſway over her huſband; and ſhe procured this command for him, that he might thereby be enabled to contend for the kingdom after his father's death. She even inſiſted that the king ſhould declare him heir to the crown before he died; but this he could not by any means be induced to do. He died in the year 405 B. C. and was ſucceeded by his ſon Artaxerxes, by the Greeks ſurnamed *Mnemon* on account of his extraordinary memory.

30
rtaxerxes
nemon.

31
evolt of
yrus the
unger.

The moſt remarkable tranſaction which happened during the reign of this prince was the revolt of his brother Cyrus. This young prince had been raiſed to ſo great power through the intereſt of his mother, on purpoſe that he might revolt, as we have already ſeen. He began with gaining over the cities under the government of Tiſſaphernes; which quickly produced a war with that governor. Cyrus then began to aſſemble troops, which he pretended were deſigned only againſt Tiſſaphernes. As he had given great aſſiſtance to the Lacedemonians in their wars againſt the Athenians, he now in return demanded aſſiſtance from them; which requeſt they very readily complied with, ordering their fleet immediately to join him, and to obey in every thing the commands of Tamos his admiral. At laſt Cyrus, having collected an army of 13,000 Greek mercenaries and 100,000 regular troops of other nations, ſet out from Sardis, directing his march towards Upper Aſia; the army being entirely ignorant of the expedition on which they were going. When they arrived at Tarſus, the Greeks, ſuſpecting that they were marching againſt the king, refuſed to proceed any farther; but Cyrus having gained them over with preſents and promiſes, they ſoon went on with ſatisfaction. Having arrived at Cunaxa in the province of Babylon, Cyrus found his brother with 900,000 men ready to engage him. Whereupon, leaping out of his chariot, he commanded his troops to ſtand to their arms and fall into their ranks; which was done with great expedition, no time being allowed the ſoldiers to refreſh themſelves. Clearchus, the commander of the Peloponneſian troops, adviſed Cyrus not to charge in perſon, but to remain in the rear of the Greek battalions; but this advice he rejected with indignation, ſaying, that he ſhould thus render himſelf unworthy of the crown for which he was fighting. As the king's army drew near, the Greeks fell upon them with ſuch a fury, that they routed the wing oppoſite to them almoſt at the firſt onſet; upon which Cyrus was with loud ſhouts proclaimed king by thoſe who ſtood next to him. But he, in the mean time, perceiving that Artaxerxes was wheeling about to attack him in flank, advanced againſt him with 600 choſen horſe, killed Artageſes captain of the king's guards with his own hand, and put the whole body to flight. In this encounter, diſcovering his brother, he ſpurred on his horſe, and, coming up to him, engaged him with great fury; which in ſome degree turned the battle into a ſingle combat. Cyrus killed his brother's horſe, and wounded him on the ground; but he immediately mounted another horſe, when Cyrus attacked him again, gave him a ſecond wound, and had already lifted up his hand to give him a third, when the guards, perceiving the danger in which their king was, diſcharged their arrows at once againſt his antagoniſt, who at the ſame time throwing himſelf headlong upon his brother, was pierced through by his javelin. He fell dead upon the ſpot; and all the chief lords of his court, reſolving not to ſurvive him, were ſlain in the ſame place.

32
Battle of
Cunaxa.

In the mean time, the Greeks having defeated the enemy's left wing commanded by Tiſſaphernes, and the king's right wing having put to flight Cyrus's left, both parties, being ignorant of what had paſſed elſewhere, imagined that they had gained the victory. But Tiſſaphernes acquainting the king that his men had been put to flight by the Greeks, he immediately rallied his troops, in order to attack them. The Greeks, under the command of Clearchus, eaſily repulſed them, and purſued them to the foot of the neighbouring hills. As night was drawing near, they halted at the foot of the hill much ſurpriſed that neither Cyrus himſelf, nor any meſſenger from him, had appeared; for as yet they knew nothing of his death and the defeat of the reſt of the army. They determined therefore to return to their camp, which they did accordingly; but found there that the greateſt part of their baggage had been plundered, and all their proviſions taken, which obliged them to paſs the night in the camp without any ſort of refreſhment. The next morning, as they were ſtill expecting to hear from Cyrus, they received the news of his death, and the defeat of that part of the army. Whereupon they ſent deputies to Ariæus, who was commander in chief of all the other forces of Cyrus, offering him, as conquerors, the crown of Perſia. Ariæus rejected the offer, and acquainting them that he intended to ſet out early in the morning on his return to Ionia, adviſed them to join him in the night. They followed his advice, and, under the conduct of Clearchus, began their

33
Retreat
of ten
thouſand
Greeks.

march, arriving at his camp about midnight, whence they ſet out on their return to Greece. They were at a vaſt diſtance from their own country, in the very heart of the Perſian empire, ſurrounded by a victorious and numerous army, and had no means of retreat but by forcing their way through an immenſe tract of the enemy's country. But their valour and reſolution maſtered all theſe difficulties; and, in ſpite of a powerful army, which purſued and haraſſed them all the way, they made good their retreat for 2325 miles through the provinces belonging to the enemy, and got ſafe to the Greek cities on the Euxine ſea. This retreat (the longeſt that was ever made through an enemy's country) was conducted at firſt by Clearchus; but he being cut off through the treachery of Tiſſaphernes, Xenophon was choſen in his room, who at laſt brought his men ſafe into Greece: but for a full account of that famous retreat, ſee the article XENOPHON.

34
War with the Lacedemonians.

The war with Cyrus was ſcarcely ended, when another broke out with the Lacedemonians, on the following account. Tiſſaphernes being appointed to ſucceed Cyrus in all his power, to which was added all which he himſelf poſſeſſed formerly, began to oppreſs the Greek cities in Aſia in a moſt cruel manner. On this they ſent ambaſſadors to Sparta, deſiring the aſſiſtance of that powerful republic. The Spartans having ended their long war with the Athenians, willingly laid hold of the preſent opportunity of breaking again with the Perſians, and therefore ſent againſt them an army under the command of Thimbro, who, being ſtrengthened by the forces which returned under Xenophon, took the field againſt Tiſſaphernes. But Thimbro being ſoon recalled upon ſome complaints, Dercyllidas, a brave officer and experienced engineer, was appointed to ſucceed him; and he carried on the war to much more advantage than his predeceſſor. On his arrival in Aſia, finding that Tiſſaphernes was at variance with another governor named *Pharnabazus*, he concluded a truce with the former, and marching againſt Pharnabazus, drove him quite out of Æolis, and took ſeveral cities in other parts. The latter, however, immediately repaired to the Perſian court, where he made loud complaints againſt Tiſſaphernes, but gave the king a moſt ſalutary advice, which was to equip a powerful fleet, and give the command of it to Conon the Athenian, the beſt ſea-officer of his time, by which means he would obſtruct the paſſage of further recruits from Greece; and thus ſoon put an end to the power of the Lacedemonians in Aſia. This advice being approved of, the king ordered 500 talents for the equipment of a fleet, with directions to give Conon the command of it.

In the mean time, Dercyllidas, with all his valour and ſkill, ſuffered himſelf to be drawn into ſuch a diſadvantageous ſituation, that he muſt inevitably have been deſtroyed with his whole army, had it not been through the cowardice of Tiſſaphernes, who having experienced the Grecian valour at the battle of Cunaxa, could not by any means be induced to attack them. The Lacedemonians, however, having heard that the Perſian monarch was fitting out a great fleet againſt them, reſolved to puſh on the war as vigorouſly as poſſible; aud for this purpoſe ſent over Ageſilaus one of their kings, and a moſt experienced commander, into Aſia. This expedition was carried on with ſuch ſecrecy that, Ageſilaus arrived at Epheſus before the Perſians had the leaſt notice of his deſigns. Here he took the field with 10,000 foot and 4000 horſe, and falling upon the enemy while they were totally unprepared, carried every thing before him. Tiſſaphernes deceived him into a truce till he had leiſure to aſſemble his forces, but gained little by his treachery; for Ageſilaus deceived him in his turn, and while Tiſſaphernes marched his troops into Caria, the Greeks invaded and plundered Phrygia.

Early in the ſpring, Ageſilaus gave out that his deſign was to invade Lydia; but Tiſſaphernes, who remembered the laſt year's ſtratagem, now taking it for granted that Ageſilaus would really invade Caria, made his troops again march to the defence of that province. But Ageſilaus now led his army into Lydia as he had given out, and approached Sardis; upon which Tiſſaphernes recalled his forces from their former route, with a deſign to relieve the place. But Caria being a very mountainous country, and unfit for horſe, he had marched thither only with the foot, and left the horſe behind on the borders of that province. Whence, on their marching back to the relief of Sardis, the horſe being ſome days march before the foot, Ageſilaus took the advantage of ſo favourable an opportunity, and fell upon them before the foot could come to their aſſiſtance. The Perſians were routed at the very firſt onſet; after which Ageſilaus overran the whole country, enriching both himſelf and his army with the ſpoils of the conquered Perſians.

By this continued ill fortune Artaxerxes was ſo much provoked againſt Tiſſaphernes, that he ſoon after cauſed him to be put to death.

On the death of Tiſſaphernes, Tithrauſtes, who was appointed to ſucceed him, ſent large preſents to Ageſilaus, in hopes of perſuading him to abandon his conqueſts; but finding that commander was not by any means to be induced to relinquiſh the war, he ſent Timocrates of Rhodes into Greece, with large ſums of money to corrupt the leading men in the cities, and rekindle a war againſt the Lacedemonians. This ſtratagem produced the intended effect; for the cities of Thebes, Argos, Corinth, and others, entering into a confederacy, obliged them to recal Ageſilaus to the defence of his own country.

35
Ageſilaus obliged to leave Aſia.

36
Lacedemonians defeated.

After the departure of Ageſilaus, which happened in the year 354 B. C. the Lacedemonian power received a ſevere blow at Cnidos, where their fleet was entirely defeated by that of Artaxerxes under Conon, 50 of their ſhips being taken in the engagement; after which, Conon and Pharnabazus being maſters of the ſea, ſailed round the iſlands and coaſts of Aſia, taking the cities there which had been reduced by the Lacedemonians. Seſtos and Abydos only held out, and reſiſted the utmoſt efforts of the enemy, though they had been beſieged both by ſea and land.

Next year Conon having aſſembled a powerful fleet, again took Pharnabazus on board, and reduced the iſland of Melos, from whence he made a deſcent on the coaſts of Lycaonia, pillaging all the maritime provinces, and loading his fleet with an immenſe booty. After this, Conon obtained leave of him to repair to Athens with 80 ſhips and 50 talents, in order to rebuild the walls of that city; having firſt convinced

Pharnabazus, that nothing could more effectually contribute to the weakening of the power of Sparta than putting Athens again in a condition to rival its power. He no ſooner arrived at Piræus the port of Athens, but he began to work; which, as he had a great number of hands, and was ſeconded by the zeal of all thoſe that were well inclined to the Athenians, was ſoon completed, and the city not only reſtored to its former ſplendor, but rendered more formidable than ever. The Lacedemonians were now reduced to the neceſſity of accepting ſuch terms of peace as they could procure. The terms were, that all the Greek cities in Aſia ſhould be ſubject to the king of Perſia, as alſo the iſlands of Cyprus and Clazomenæ; that the iſlands of Scyros, Lemnos, and Imbros, ſhould be reſtored to the Athenians, and all the cities of Greece, whether ſmall or great, ſhould be declared free; and by the ſame treaty, Artaxerxes engaged to join thoſe who accepted the terms he propoſed, and to aſſiſt them to the utmoſt of his power againſt ſuch as ſhould reject them.

37 ...ed peace with ...

38 ... re-...ed.

Artaxerxes, being now diſengaged from the Grecian war, turned his arms againſt Evagoras king of Cyprus. This man was deſcended from the ancient kings of Salamine the capital city of the iſland of Cyprus. His anceſtors had held that city for many ages in quality of ſovereigns; but were at laſt driven out by the Perſians, who, making themſelves maſters of the whole iſland, reduced it to a Perſian province. Evagoras, however, being a man of an enterpriſing genius, ſoon became weary of living in ſubjection to a foreign power, drove out the Perſian governor, and recovered his paternal kingdom. Artaxerxes attempted to drive him out of it; but, being diverted by the Greek war, was obliged to put off the enterprize. However, Conon, by means of Cteſias chief phyſician to Artaxerxes, got all differences accommodated, and Artaxerxes promiſed not to moleſt him in the poſſeſſion of his ſmall kingdom. But Evagoras ſoon becoming diſcontented with ſuch a narrow poſſeſſion, gradually reduced under his ſubjection almoſt the whole of the iſland. Some, however, there were, who held out againſt him, and theſe immediately applied to Artaxerxes for aſſiſtance; and he, as ſoon as the war with Greece was at an end, bent all his force againſt Evagoras, intending to drive him quite out of the iſland. The Athenians, however, notwithſtanding the favours lately conferred upon them by the king of Perſia, could not forbear aſſiſting their old ally in ſuch a dreadful emergency. Accordingly, they ſent him ten men of war under the command of Philocrates; but the Lacedemonian fleet, commanded by Talentias brother to Ageſilaus, falling in with them near the iſle of Rhodes, ſurrounded them ſo that not one ſhip could eſcape. The Athenians, determined to aſſiſt Evagoras at all events, ſent Chabrias with another fleet and a conſiderable body of land forces; and with the aſſiſtance of theſe he quickly reduced the whole iſland. But in a ſhort time, the Athenians being obliged, in conſequence of the treaty concluded with the Perſians, to recal Chabrias, Artaxerxes attacked the iſland with an army of 300,000 men, and a fleet of 300 ſhips. Evagoras applied to the Egyptians, Libyans, Arabians, Tyrians, and other nations, from whom he received ſupplies both of men and money; and fitted out a fleet, with which he ventured an engagement with that of Artaxerxes. But being defeated, and obliged to ſhut himſelf up in Salamine, he was cloſely beſieged by ſea and land. Here at laſt he was obliged to ſue for peace, and abandon to the Perſians the whole of the iſland except Salamine, which he held as a king tributary to Artaxerxes.

The Cyprian war being ended, Artaxerxes turned his arms againſt the Caduſians, whoſe country lay between the Euxine and Caſpian ſeas. But theſe nations were too well accuſtomed to war to be overcome by the Perſians; and therefore the king was obliged to abandon the project, after having loſt a great number of his troops and all the horſes which he took out with him. In his Egyptian expedition, which happened immediately after the Caduſian war, he was attended with little better ſucceſs; which, however, was owing to the bad conduct of his general Pharnabazus. This commander being entruſted with the management of the Egyptian war, ſent an ambaſſador to Athens, complaining that Chabrias had engaged in the ſervice of an enemy of the king of Perſia, with whom the ſtate of Athens was in alliance, and threatening the republic with his maſter's reſentment if proper ſatisfaction was not given: at the ſame time he demanded Iphicrates, another Athenian, and the beſt general of his time, to command the Greek mercenaries in the Perſian ſervice. This the Athenians complied with; and Iphicrates having muſtered his troops, ſo exerciſed them in all the arts of war, that they became afterwards very famous among the Greeks under the name of *Iphicratenſian ſoldiers*. Indeed he had ſufficient time to inſtruct them; for the Perſians were ſo ſlow in their preparations, that two whole years elapſed before they were ready to take the field. At the ſame time Artaxerxes, that he might draw the more mercenaries out of Greece, ſent ambaſſadors to the different ſtates in it, declaring it to be his will and pleaſure that they ſhould live at peace with each other, on the terms of the treaty lately concluded: which declaration was received with pleaſure by all the ſtates except Thebes, who aſpired at the ſovereignty of Greece; and accordingly refuſed to conform to it. All things, however, at laſt being ready for the expedition, the troops were muſtered at the city then called *Ace*, and ſince *Ptolemais;* where they were found to conſiſt of 200,000 Perſians under the command of Pharnabazus, and 20,000 Greeks led by Iphicrates. The fleet conſiſted of 300 galleys, beſides a vaſt number of other veſſels which followed with proviſions. The fleet and army began to move at the ſame time; and that they might act in concert, they ſeparated as little as poſſible. It was propoſed, that the war ſhould begin with the ſiege of Peluſium; but Nectanebus, the revolted king of Egypt, had provided ſo well for the defence of the place, that it was thought expedient to drop the enterprize, and make a deſcent at one of the mouths of the Nile. In this they ſucceeded; for the Egyptians not expecting them at that place, had not taken ſuch care to fortify it as at Peluſium. The fortreſs of conſequence was eaſily taken, and all the Egyptians in it put to the ſword. After this, Iphicrates was for embarking the troops without loſs of time, and attacking Memphis the capital of Egypt. Had this opinion been followed before the Egyptians recovered from the conſternation into which they were thrown, it is highly probable that the whole country might have been reduced at once. But Pharnabazus would undertake nothing before the reſt of the force were come up. Iphicrates [illegible]

...ditions a...ainſt the ... and Egyptians.

the utmoſt vexation at loſing ſo favourable an opportunity, preſſed Pharnabazus to allow him to attack the place with the Greek mercenaries only; but he refuſed this alſo, from a mean jealouſy of the honour which Iphicrates might acquire; and in the mean time the Egyptians recovered ſufficient courage to put themſelves in ſuch a poſture of defence, that they could not be attacked with any probability of ſucceſs; and at the ſame the Nile overflowing as uſual, obliged them to return to Phœnice. The expedition was again undertaken 12 years after, but without ſucceſs.

40
Ochus ſucceeds Artaxerxes.

The laſt years of the reign of Artaxerxes were greatly diſturbed by diſſenſions in his family; which at laſt broke his heart, and he died in the 94th year of his age, and 46th of his reign. He was ſucceeded by one of his ſons named *Ochus*, who behaved with ſuch cruelty, that almoſt one half of his dominions revolted as ſoon as he came to the throne. But, by reaſon of the diſſenſions of the rebels among themſelves, all of them were reduced, one after another; and among the reſt, the Sidonians, finding themſelves betrayed, burnt themſelves to the number of 40,000, together with their wives and children.

41
Reduces Egypt.

Ochus, having quelled all the inſurgents, immediately ſet himſelf about reducing Egypt, and for this purpoſe procured a reinforcement of other 10,000 mercenaries from Greece. On his march, he loſt a great number of his men drowned in the lake Serbonis, which lies between Phœnice and Egypt, extending about 30 miles in length. When the ſouth wind blows, the whole ſurface of this lake is covered with ſand, in ſuch a manner that no one can diſtinguiſh it from the firm land. Several parties of Ochus's army were loſt in it for want of proper guides; and it is ſaid that whole armies have ſometimes periſhed in the ſame place. When he arrived in Egypt, he detached three bodies to invade the country in different parts; each being commanded by a Perſian and a Greek general. The firſt was led by Lachares the Theban, and Roſaces governor of Lydia and Ionia: the ſecond by Nicoſtratus the Theban and Ariſtazanes; the third by Mentor the Rhodian and Bagoas an eunuch. The main body of the army he kept with himſelf, and encamped near Peluſium, with a deſign to watch the events of the war there. The event was ſucceſsful, as we have related under the article Egypt; and Ochus having reduced the whole country, diſmantled their ſtrongholds, plundered the temples, and returned to Babylon loaded with booty.

The king, having ended this war with ſuch ſucceſs, conferred very high rewards on his mercenaries and others who had diſtinguiſhed themſelves. To Mentor the Rhodian he gave 100 talents, and other preſents to a great value; appointing him alſo governor of all the coaſts of Aſia, and committing to his care the whole management of the war which he was ſtill carrying on againſt ſome provinces that had revolted in the beginning of his reign; and all theſe either by ſtratagem, or by force, he at laſt reduced; reſtoring the king's authority in all theſe places.—Ochus then, finding himſelf free from all troubles, gave his attention to nothing but his pleaſures, leaving the adminiſtration of affairs entirely to Bagoas the eunuch, and to Mentor. Theſe two agreed to ſhare the power between them; in conſequence of which the former had the provinces of Upper Aſia, and the latter all the reſt. Bagoas, being by birth an Egyptian, had a great zeal for the religion of his country, and endeavoured, on the conqueſt of Egypt, to influence the king in favour of the Egyptian ceremonies; but, in ſpite of all his endeavours, Ochus not only refuſed to comply, but killed the ſacred bull, the emblem of the Egyptian god Apis, plundered the temples, and carried away their ſacred records. This Bagoas ſuppoſed to be the higheſt guilt which a human creature could commit; and therefore poiſoned his maſter and benefactor in the 21ſt year of his reign. Nor did his revenge ſtop here; for he kept the king's body, cauſing another to be buried in its ſtead; and becauſe the king had cauſed his attendants eat the fleſh of Apis, Bagoas cut his body in pieces, and gave it ſo mangled to be devoured by cats, making handles for ſwords of his bones. He then placed Arſes the youngeſt of the deceaſed king's ſons on the throne, that he might the more eaſily preſerve the whole power to himſelf.

42
Ochus murdered by Bagoas.

43
Darius Codomannus.

44
Perſia conquered by Alexander the Great.

45
Darius ſeized by his own ſubjects.

Arſes did not long enjoy even the ſhadow of power which Bagoas allowed him, being murdered in the ſecond year of his reign by that treacherous eunuch, who now conferred the crown on Darius Codomannus, a diſtant relation of the royal family. Neither did he incline to let him enjoy the crown much longer than his predeceſſor; for, finding that he would not ſuffer himſelf to be guided by him in all things, the treacherous Bagoas brought him a poiſonous potion, but Darius got rid of him by his own artifice, cauſing him to drink the poiſon which he brought. This eſtabliſhed Darius in the throne as far as ſecurity from internal enemies could do ſo; but in a very little time his dominions were invaded, and, we may ſay, the ſame moment conquered, by Alexander the Great. The particulars of that hero's conqueſt are related under the article Macedon; we ſhall therefore here only take notice of the fate of Darius himſelf, with which the Perſian empire concluded for many ages. After the battle of Arbela, which was deciſive in favour of Alexander, the latter took and plundered Perſepolis, from whence he marched into Media, in order to purſue Darius, who had fled to Ecbatan the capital of that province. This unhappy prince had ſtill an army of 30,000 foot, among whom were 4000 Greeks, who continued faithful to the laſt. Beſides theſe, he had 4000 ſlingers and 3000 horſe, moſt of them Bactrians, and commanded by Beſſus governor of Bactria. When Darius heard that Alexander was marched to Ecbatan, he retired into Bactria, with a deſign to raiſe another army; but ſoon after, changing his mind, he determined to venture a battle with the forces he ſtill had left. On this Beſſus governor of Bactria, and Nabarzanes a Perſian lord of great diſtinction, formed a conſpiracy againſt him, propoſing to ſeize his perſon, and, if Alexander purſued them, to gain his friendſhip and protection by betraying their maſter into his hands; but if they eſcaped, their deſign was to murder him, and uſurp the crown. The troops were eaſily gained over, by repreſenting to them the deſperate ſituation of Darius's affairs; but Darius himſelf, though informed of their proceedings, and ſolicited to truſt his perſon among the Greeks, refuſed to give credit to the report, or follow ſuch a ſalutary counſel. The conſequence of this was, that he was in a few days ſeized by the traitors; who, out of reſpect to the royal dignity, bound him with golden chains, and ſhutting him up in a covered cart, fled with him towards Bactria. The cart was covered with ſkins, and ſtrangers appointed to drive it without knowing who the priſoner was. Beſſus was proclaimed commander in chief in the room of Darius by the Bactrian horſe; but Artabazus and his ſons, with the forces they commanded, and the Greeks, under the command of one *Patron*, retired from the body of the army under Beſſus, and marched over the mountains towards Parthiene. In the mean time Alexander arriving at Ecbatan, was informed that Darius had left the place five days before. He then diſpatched orders to Clitus, who had fallen ſick at Suſa, to repair, as ſoon as he recovered, to Ecbatan, and from thence to follow him into Parthia with the cavalry and 6000 Macedonians, who were left in Ecbatan. Alexander himſelf with the reſt of the army purſued Darius; and the 11th day arrived at *Rhages*, having marched in that ſpace of time 3300 furlongs. Moſt of thoſe who accompanied him died through the fatigue of ſo long a march; inſomuch that, on his arrival at Rhages, he could ſcarcely muſter 60 horſemen. Finding that he could not come up with Darius, who had already paſſed the Caſpian ſtraits, he ſtaid five days at Rhages, in order to refreſh his army and ſettle the affairs of Media. From thence he marched into Parthia, and encamped at a ſmall diſtance from the Caſpian ſtraits, which he paſſed the next day without oppoſition. He had ſcarcely entered Parthia, when he was informed that Beſſus and Nabarzanes had conſpired againſt Darius, and deſigned to ſeize him. Hereupon, leaving the main body of the army behind with Craterus, he advanced with a ſmall troop of horſe lightly armed; and having marched day and night without ever halting, except for a few hours, he came on the third day to a village where Beſſus with his Bactrians had encamped the day before. Here he underſtood that Darius had been ſeized by the traitors; that Beſſus had cauſed him to be ſhut up in a cloſe cart, which he had ſent before, that he might be the more ſure of his perſon; and that the whole army except Artabazus and the Greeks, who had taken another route, obeyed Beſſus. Alexander therefore taking with him a ſmall body of light-armed horſe, for the others could not poſſibly proceed further, at laſt came in ſight of the barbarians, who were marching in great confuſion. His unexpected appearance ſtruck them, though far ſuperior in number, with ſuch terror, that they immediately betook themſelves to flight; and becauſe Darius refuſed to follow them, Beſſus and thoſe who were about him diſcharged their darts at the unfortunate prince, leaving him wallowing in his blood. After this they all fled different ways, and were purſued with great ſlaughter by the Macedonians. In the mean time the horſes that drew the cart in which Darius was, ſtopped of their own accord, for the drivers had been killed by Beſſus, near a village about four furlongs from the highway. Thither Polyſtratus a Macedonian, being preſſed with thirſt in the purſuit of the enemy, was directed by the inhabitants to a fountain to refreſh himſelf, not far from the place where they ſtopped. As he was filling his helmet with water, he heard the groans of a dying man; and looking round him, diſcovered a cart with a team of horſes, unable to move by reaſon of the many wounds they had received. When he drew near, he perceived Darius lying in the cart, and very near his end, having ſeveral darts ſticking in his body. However, he had ſtrength enough left to call for ſome water, which Polyſtratus readily brought him. Darius, after drinking, turned to the Macedonian, and with a faint voice told him, that, in the deplorable ſtate to which he was reduced, it was no ſmall comfort to him that his laſt words would not be loſt: he then charged him to return his hearty thanks to Alexander for the kindneſs he had ſhown to his wife and family, and to acquaint him, that, with his laſt breath, he beſought the gods to proſper him in all his undertakings, and make him ſole monarch of the univerſe. He added, that it did not ſo much concern him as Alexander to purſue and bring to condign puniſhment thoſe traitors who had treated their lawful ſovereign with ſuch cruelty, that being the common cauſe of all crowned heads. Then, taking Polyſtratus by the hand, "Give Alexander your hand, ſays he, as I give you mine, and carry him, in my name, the only pledge I am able to give, in this condition, of my gratitude and affection." Having uttered theſe words, he expired in the arms of Polyſtratus. Alexander coming up a few minutes after, bewailed his death, and cauſed his body to be interred with the higheſt honours. The traitor Beſſus being at laſt reduced to extreme difficulties, was delivered up by his own men naked and bound into the hands of the Macedonians; on which Alexander gave him up to Oxathres the brother of Darius, to ſuffer what puniſhment he ſhould think proper. Plutarch tells us that he was executed in the following manner: Several trees being by main force bent down to the ground, and one of the traitor's limbs tied to each of them, the trees, as they were ſuffered to return to their natural poſition, flew back with ſuch violence, that each carried with it the limb that was tied to it.

46 nd murdered.

47 His murderers puniſhed.

Thus ended the empire of Perſia, 209 years after it had been founded by Cyrus. After the death of Alexander the Perſian dominions became ſubject to Seleucus Nicator, and continued ſubject to him for 62 years, when the Parthians revolted, and conquered the greateſt part of them. To the Parthians they continued ſubject for 475 years; when the ſovereignty was again reſtored to the Perſians, as related under the article PARTHIA.

48 Revolt of the Parthians.

The reſtorer of the Perſian monarchy was Artaxerxes, or Artaxares, who was not only a private perſon, but of ſpurious birth. However, he poſſeſſed great abilities, by which means he executed his ambitious projects. He was no ſooner ſeated on the throne than he took the pompous title of *king of kings*, and formed a deſign of reſtoring the empire to its ancient glory. He therefore gave notice to all the Roman governors of the provinces bordering on his dominions, that he had a juſt right, as the ſucceſſor of Cyrus, to all the Leſſer Aſia; which he therefore commanded them immediately to quit, as well as the provinces on the frontiers of the ancient Perſian kingdom, which were already his. The conſequence of this was a war with Alexander Severus the Roman emperor. Concerning the event of this war there are very different accounts. It is certain, however, that, on account of his exploits againſt Artaxares, Alexander took the title of *Parthicus* and *Perſicus*; though it would ſeem, with no

49 Perſian empire again reſtored by Artaxerxes.

great reaſon, as the Perſian monarch loſt none of his dominions, and his ſucceſſors were equally ready with himſelf to invade the Roman territories.

50
Succeeded by Sapor, who takes Valerian the Roman emperor priſoner;

Artaxares dying after a reign of 12 or 15 years, was ſucceeded by his ſon Sapor; a prince of great abilities both of body and mind, but fierce, haughty, untractable, and cruel. He was no ſooner ſeated on the throne than he began a new war with the Romans. In the beginning he was unſucceſsful: being obliged, by the young emperor Gordian, to withdraw from the Roman dominions, and was even invaded in his turn; but, in a ſhort time, Gordian being murdered by Philip, the new emperor made peace with him upon terms very advantageous to the Perſians. He was no ſooner gone than Sapor renewed his incurſions, and made ſuch alarming progreſs, that the emperor Valerian, at the age of 70, marched againſt him in perſon with a numerous army. An engagement enſued, in which the Romans were defeated, and Valerian taken priſoner. Sapor purſued his advantages with ſuch inſolence of cruelty, that the people of the provinces took arms, firſt under Calliſtus a Roman general, and then under Odenatus prince of Palmyrene. Thus they not only protected themſelves from the inſults of the Perſians. but even gained many great victories over them, and drove Sapor with diſgrace into his own dominions. In his march he is ſaid to have made uſe of the bodies of his unfortunate priſoners to fill up the hollow roads, and to facilitate the paſſage of his carriages over ſuch rivers as lay in his way.

51
and treats him cruelly.

On his return to Perſia, he was ſolicited by the kings of the Caduſians, Armenians, Bactrians, and other nations, to ſet Valerian at liberty; but to no purpoſe. On the contrary, he uſed him the worſe; treated him daily with indignities, ſet his foot upon his neck when he mounted his horſe, and, as is affirmed by ſome, flayed him alive after ſome years confinement; and cauſed his ſkin to be tanned, which he kept as a monument of his victory over the Romans. This extreme inſolence and cruelty was followed by an uninterrupted courſe of misfortune. Odenatus defeated him in every engagement, and even ſeemed ready to overthrow his empire; and after him Aurelian took ample vengeance for the captivity of Valerian. Sapor died in the year of Chriſt 273, after having reigned 31 years; and was ſucceeded by his ſon Hormiſdas, and he by Varanes I. Concerning both theſe princes we know nothing more than that the former reigned a year and ten days, and the latter three years; after which he left the crown to Varanes II. who ſeems to have been ſo much awed by the power of the Romans, that he durſt undertake nothing. The reſt of the Perſian hiſtory, to the overthrow of the empire by the Saracens, affords nothing but an account of their continued invaſions of the Roman empire, which more properly belongs to the hiſtory of ROME: and to which therefore we refer.

52
The Perſian empire overthrown by the Saracens.

The laſt of the Perſian monarchs, of the line of Artaxares, was Iſdigertes, or Jezdegerd, as he is called by the Arabian and Perſian hiſtorians, who was cotemporary with Omar the ſecond caliph after Mahomet. He was ſcarcely ſeated on the throne, when he found himſelf attacked by a powerful army of Saracens under the command of one Sad, who invaded the country through Chaldea. The Perſian general took all imaginable pains to haraſs the Arabs on their march; and having an army ſuperior to them in numbers, employed them continually in ſkirmiſhes; which were ſometimes favourable to him and ſometimes otherwiſe. But Sad, perceiving that this lingering war would deſtroy his army, determined to haſten forward, and force the enemy to a general engagement. The Perſians declined this for a long time; but at length, finding a convenient plain where all their forces might act, they drew up in order of battle, and reſolved to wait for the Arabs. Sad having diſpoſed his men in the beſt order he could, attacked the Perſians with the utmoſt fury. The battle laſted three days and three nights; the Perſians retiring continually from one poſt to another, till at laſt they were entirely defeated; and thus the capital city, and the greateſt part of the dominions of Perſia, fell into the hands of the Arabs. The conquerors ſeized the treaſures of the king; which were ſo vaſt, that according to a Mahometan tradition, their prophet gave the Saracen army a miraculous view of thoſe treaſures before the engagement, in order to encourage them to fight.

After the loſs of this battle, Jezdegerd retired into Choraſan, where he maintained himſelf as king, having under his ſubjection two other provinces, named *Kerman* and *Segeſtan*. But after he had reigned in this limited manner for 19 years, one of the governors of the few towns he had left betrayed it, and called in the Turks. This place was called *Merou*, ſeated on the river Gihon or Oxus. Jezdegerd immediately marched againſt the rebels and their allies. The Perſians were defeated; and the unfortunate monarch, having with much difficulty reached the river, found there a little boat, and a fiſherman to whom it belonged. The king offered him a bracelet of precious ſtones; but the fellow, equally brutal and ſtupid, told him that his fare was five farthings, and that he would neither take more nor leſs. While they diſputed, a party of the rebel horſe came up, and knowing Jezdegerd, killed him, in the year 652.

Jezdegerd left behind him a ſon named *Firouz*, and a daughter named *Dara*. The latter eſpouſed Boſtenay, whom the rabbinical writers have dignified with the title of the *head of the captivity;* and who, in fact, was the prince of the Jews ſettled in Chaldea. As for Firouz, he ſtill preſerved a little principality; and when he died, left a daughter named *Mah Afrid*, who married Walid the ſon of the caliph Abdalmalek, by whom ſhe had a ſon named *Yezid*, who became caliph, and conſequently ſovereign of Perſia; and ſo far was this prince from thinking himſelf above claiming the title derived from his mother, that he conſtantly ſtyled himſelf *the ſon of Khoſrou king of Perſia, the deſcendant of the caliph Marvan, and among whoſe anceſtors on the ſide of the mother were the Roman emperor and the khacan.*

53
State of Perſia under the Mogul princes.

Perſia continued to be ſubject to the Arabs till the decline of the Saracen empire, when it was ſeized by various uſurpers, till the time of Jenghis Khan, who conquered it as well as almoſt all the reſt of Aſia. After his death, which happened in the year 1227, Perſia, together with the neighbouring countries, were governed by officers appointed by his ſucceſſors, who reigned at Karakorom, in the eaſtern parts of Tartary, till the year 1253, when it became once more the ſeat of a mighty empire under Hulaku the Mogul, who in 1256 aboliſhed the caliphate, by taking the city of BAGDAD, as related under that article. After the death of Hulaku,

Perſia.

laku, his ſon Abaka ſucceeded to his extenſive dominions; and his firſt care was to ſhut up all the avenues of his empire againſt the other princes of the race of Jenghiz Khan, who reigned in different parts of Tartary. His precautions, however, were of little avail; for in the very beginning of his reign he was invaded by Barkan Khan, of the race of Jagatay the ſon of Jenghiz Khan, from Great Bukharia, with an army of 300,000 men. Abaka was but indifferently prepared to oppoſe ſuch a formidable power; but, happily for him, his antagoniſt died before the armies came to an engagement, upon which the invaders diſperſed and returned to Tartary. In the year 1264, Armenia and Anatolia were ravaged by the Mamlucks from Egypt, but they were obliged to fly from Abaka; who thus ſeemed to be eſtabliſhed in the poſſeſſion of an empire almoſt as extenſive as that of the ancient Perſian kings. His tranquility, however, was of ſhort duration; for, in 1268, his dominions were invaded by Borak Khan, a prince likewiſe of the race of Jagatay, with an army of 100,000 men. He quickly reduced the province of Choraſan, where he met with little oppoſition, and in 1269 advanced as far as Aderbijan, where Abaka had the bulk of his forces. A bloody battle enſued; in which Abaka was victorious, and Borak obliged to fly into Tartary, with the loſs of all his baggage and great part of his army. Abaka died in 1282, after a reign of 17 years, not without ſuſpicion of being poiſoned; and was ſucceeded by his brother Ahmed Khan. He was the firſt of the family of Jenghiz Khan who embraced Mahometaniſm; but neither he nor his ſucceſſors appear to have been in the leaſt verſed in the arts of government; for the Perſian hiſtory, from this period, becomes only an account of inſurrections, murders, rebellions, and poiſonings, till the year 1335, when it ſplit all to pieces, and was poſſeſſed by a great number of petty princes; all of whom were at perpetual war with each other till the time of Timur Beg, or Tamerlane, who once more reduced them all under one juriſdiction.

54
Under Tamerlane and his ſucceſſors.

After the death of Tamerlane, Perſia continued to be governed by his ſon Shah Rukh, a wiſe and valiant prince: but immediately after his death fell into the ſame confuſion as before; being held by a great number of petty tyrants, till the beginning of the 16th century, when it was conquered by Shah Iſmael Safi, or Sefi; of whoſe family we have the following account. His father was Sheykh Hayder or Haydr, the ſon of Sultan Juneyd, the ſon of Sheykh Ibrahim, the ſon of Sheykh Ali, the ſon of Sheykh Muſa, the ſon of Sheykh Sefi, who was the 13th in a direct line from Ali the ſon-in-law of the prophet Mahomet. When Tamerlane returned from the defeat of Bajazet the Turkiſh ſultan, he carried with him a great number of captives out of Caramania and Anatolia, all of whom he intended to put to death on ſome remarkable occaſion; and with this reſolution he entered Ardebil, or Ardevil, a city of Aderbijan, about 25 miles to the eaſt of Taurus, where he continued for ſome days. At this time lived in that city the Sheykh Safi, or Sefi, above mentioned, reputed by the inhabitants to be a ſaint; and, as ſuch, much reverenced by them. The fame of Safi's ſanctity ſo much moved Tamerlane, that he paid him frequent viſits; and, when he was about to depart, promiſed to grant whatever favour he ſhould aſk. Sheykh Safi, who had been informed of Tamerlane's deſign to put the captives to death, requeſted of the conqueror that he would ſpare the lives of thoſe unfortunate men. Tamerlane, deſirous of obliging him, not only granted this requeſt, but delivered them up to him to be diſpoſed of as he thought fit; upon which the Sheykh furniſhed them with clothes and other neceſſaries as well as he could, and ſent them home to their reſpective countries. This generous action proved very beneficial to the family; for the people were ſo much affected with ſuch an extraordinary inſtance of virtue, that they repaired in great numbers to Safi, bringing with them conſiderable preſents; and this ſo frequently, that few days paſſed in which he was not viſited by many. Thus the deſcendants of the Sheykh made a conſpicuous figure till the year 1486, when they were all deſtroyed by the Turcomans except Iſmael, who fled to Ghilan, where he lived under the protection of the king of that country; after which he became conſpicuous on the following occaſion.

55
Conquered by Iſmael Sefi.

There was at that time, among the Mahometans, a vaſt number of people diſperſed over Aſia; and among theſe a particular party who followed that of Haydr the father of Iſmael, which Sheykh Safi, one of his anceſtors, had brought into great reputation. Iſmael, who had aſſumed the ſurname of *Sofi*, or *Sage*, finding that Perſia was all in confuſion, and hearing that there was a great number of the Hayderian ſect in Caramania, removed thither. There he collected 7000 of his party, all devoted to the intereſt of his family; and while he was yet only 14 years of age, conquered Shirwan. After this he purſued his conqueſts; and as his antagoniſts never united to oppoſe him, had conquered the greateſt part of Perſia, and reduced the city of Bagdad by the year 1510. However, his conqueſts on the weſt ſide were ſoon ſtopped by the Turks; for, in 1511, he received a great defeat from Selim I. who took Tauris; and would probably have cruſhed the empire of Iſmael in its infancy, had he not thought the conqueſt of Egypt more important than that of Perſia. After his defeat by Selim, Iſmael never undertook any thing of conſequence. He died in 1523, leaving the crown to his eldeſt ſon Thamaſp I.

The new ſhah was a man of very limited abilities, and was therefore invaded by the Turks almoſt inſtantly on his acceſſion to the throne. However, they were obliged to retreat by an inundation, which overflowed their camp, and which frightened them with its red colour, probably ariſing from the nature of the ſoil over which it paſſed. Thamaſp, however, reduced Georgia to a province of the Perſian empire; that country being in his time divided among a number of petty princes, who, by reaſon of their diviſions, were able to make little oppoſition.

56
Reign of Shah Abbas the Great.

The reigns of the ſucceeding princes afford nothing remarkable till the time of Shah Abbas I. ſurnamed the *Great*. He aſcended the throne in the year 1585, and his firſt care was to recover from the Turks and Tartars the large provinces they had ſeized which formerly belonged to the Perſian empire. He began with declaring war againſt the latter, who had ſeized the fineſt part of Choraſan. Accordingly, having raiſed a powerful army, he entered that province, where he was met by Abdallah Khan the chief of the Uſbeck Tartars. The two armies lay in ſight of each other for ſix months;

but at length Abbas attacked and defeated his enemies, forcing them, for that time, to abandon Choraſan. Here he continued for three years; and on his leaving this place, fixed the ſeat of government at Iſpahan, where it has continued ever ſince. His next expedition was againſt the Turks. Underſtanding that the garriſon of Tauris was in no expectation of an enemy, he formed a deſign of ſurpriſing the place; and having privately aſſembled a few forces, he marched with ſuch celerity, that he reached a paſs called *Shibli* very near Tauris, in ſix days, though it is uſually 18 or 20 days journey for the caravans. Here the Turks had poſted a few ſoldiers, rather for the purpoſe of collecting the cuſtoms on ſuch commodities as were brought that way, than of defending the paſs againſt an enemy. Before they came in ſight of this paſs, Abbas and ſome of his officers left the reſt of the army, and rode briſkly up to the turnpike. Here the ſecretary of the cuſtom-houſe, taking them for merchants, demanded the uſual duties. Abbas replied, that the perſon who had the purſe was behind, but at the ſame time ordered ſome money to be given him. But while the ſecretary was counting it, he was ſuddenly ſtabbed by the Shah's order; and the officers who were with him ſuddenly falling upon the few ſoldiers who were there, obliged them to ſubmit; after which he entered the paſs with his army. The governor of Tauris marched out with all the troops he could collect on ſo ſhort a warning; but being inferior to the Perſians, he was utterly defeated, and himſelf taken priſoner; after which the city was obliged to ſubmit, as alſo a number of places in the neighbourhood. One city only called *Orumi*, being very ſtrongly ſituated, reſiſted all the efforts of Abbas; but was at laſt taken by the aſſiſtance of the Curds, whom he gained over by promiſing to ſhare the plunder of the place with them. But inſtead of this, he formed a deſign to cut them all off at once; fearing that they might at another time do the Turks a ſervice of the ſame nature that they had done to him juſt now. For this reaſon he invited their chiefs to dine with him; and having brought them to a tent, the entrance to which had ſeveral turnings, he ſtationed on the inſide two executioners, who cut off the heads of the gueſts as ſoon as they entered.

After this Shah Abbas conſiderably enlarged his dominions, and repelled two dangerous invaſions of the Turks. He attempted alſo to promote commerce, and civilize his ſubjects; but ſtained all his great actions by his abominable cruelties, which he practiſed on every one who gave him the leaſt cauſe of offence; nay, frequently without any cauſe at all. He took the iſle of Ormus from the Portugueſe, who had kept it ſince 1507, by the aſſiſtance of ſome Engliſh ſhips in 1622; and died ſix years after, aged 70.

57 Hiſtory of Khouli Khan.

The princes who ſucceeded Shah Abbas the Great, were remarkable only for their cruelties and debaucheries, which occaſioned a revolution in 1716, when the Shah Huſſein was dethroned by the Afghans, a people inhabiting the country between Perſia and India; who being oppreſſed by the miniſters, revolted under the conduct of one Mereweis. The princes of the Afghan race continued to enjoy the ſovereignty for no more than 16 years, when Aſhraff the reigning ſhah was dethroned by one of his officers *. On this Thamaſp, otherwiſe called *Prince Thamas*, the only ſurvivor of the family of Abbas, aſſembling an army, invited into his ſervice Nadir Khan, who had obtained great reputation for his valour and conduct. He was the ſon of a Perſian nobleman, on the frontiers of Uſbeck Tartary; and his uncle, who was his guardian, keeping him out of poſſeſſion of the caſtle and eſtate which was his inheritance, he took to robbing the caravans; and, having increaſed his followers to upwards of 5000 men, became the terror of that part of the country, and eſpecially of his uncle, who had ſeized his eſtate. His uncle therefore reſolved to make his peace with him, and with that view invited him to the caſtle, where he entertained him in a ſplendid manner; but Nadir Khan ordered his throat to be cut next night, and all his people to be turned out of the caſtle. No ſooner had Nadir Khan got the command of the Perſian army, than he attacked and defeated the uſurper Eſriff, put him to death, and recovered all the places the Turks and Ruſſians had made themſelves maſters of during the rebellion; and then Prince Thamas ſeemed to be eſtabliſhed on the throne: but Nadir Khan, to whom Thamas had given the name of *Thamas Kouli Khan*, that is, *the Slave of Thamas*, thinking his ſervices not ſufficiently rewarded, and pretending that the king had a deſign againſt his life, or at leaſt to ſet him aſide, conſpired againſt his ſovereign, and put him to death, as is ſuppoſed: after which, he uſurped the throne, ſtyling himſelf *Shah Nadir* or *King Nadir*.

He afterwards laid ſiege to Candahar, of which a ſon of Mereweis had poſſeſſed himſelf. During this ſiege, the court of the Great Mogul being diſtracted with factions, one of the parties invited Shah Nadir to come to their aſſiſtance, and betrayed the Mogul into his hands. He thereupon marched to Delhi, the capital of India, and ſummoned all the viceroys and governors of provinces to attend him, and bring with them all the treaſures they could raiſe; and thoſe that did not bring as much as he expected, he tortured and put to death. Having thus amaſſed the greateſt treaſure that ever prince was maſter of, he returned to Perſia, giving the Mogul his liberty, on condition of his reſigning the provinces on the weſt ſide of the Indus to the crown of Perſia. He afterwards made a conqueſt of Uſbeck Tartary, and plundered Bochara the capital city. Then he marched againſt the Dagheſtan Tartars; but loſt great part of his army in their mountains, without fighting. He defeated the Turks in ſeveral engagements; but laying ſiege to Bagdad, was twice compelled to raiſe the ſiege. He proceeded to change the religion of Perſia to that of Omar, hanged up the chief prieſts, put his own ſon to death, and was guilty of ſuch cruelty, that he was at length aſſaſſinated by his own relations, anno 1747. A conteſt upon this enſued between theſe relations for the crown, which has rendered Perſia a ſcene of the moſt horrible confuſion for upwards of 40 years.

58 Different pretenders to the throne of Perſia.

The reader will form ſome notion of the troubles of this unhappy country from the following ſeries of pretenders to the throne between the death of Nadir and the acceſſion of Kerim Khan. We give it from Francklin's Obſervations. " 1ſt, Adil Shah.—2d, Ibraheem Shah.—3d, Shah Rokh Shah.—4th, Suleeman Shah.—5th, Iſmaeel Shah.—6th, Azad Khan Afghan.—7th, Hoſſun Khan Kejar.—8th, Ali Merdan Khan Bukhteari.—9th, Kerim Khan Zund.

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* See *Patans*.

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"Their reigns, or more properly the length of time they reſpectively governed with their party, were as follows: Adil Shah, nine months. Ibraheem Shah, ſix months. Shah Rokh Shah, after a variety of revolutions, at length regained the city of Meſchid: he is now alive (1787), and about 80 years of age, reigning in Choraſan, under the direction of his ſon Nuſſir Ullah Meerza. Soleeman Shah, and Iſmaeel Shah, in about forty days were both cut off, almoſt as ſoon as they were elevated. Azad Khan Afghan, one of Kerim Khan's moſt formidable rivals and competitors, was ſubdued by him, brought priſoner to Shirauz, and died there a natural death. Heſſun Khan Kejar, another of Kerim Khan's competitors, was beſieging Shirauz, when his army ſuddenly mutinied and deſerted him. The mutiny was attributed to their want of pay. A party ſent by Kerim Khan took him priſoner. His head was inſtantly cut off, and preſented to Kerim Khan. His family were brought captives to Shirauz. They were well treated, and had their liberty given them ſoon after, under an obligation not to quit the city. Ali Merdan Khan was killed by a muſket ſhot as he was walking on the ramparts of Meſchid encouraging his men. Kerim Khan Zund, by birth a Curdiſtan, was a moſt favourite officer of Nadir Shah, and at the time of his death was in the ſouthern provinces. Shirauz and other places had declared for him. He found means at laſt, after various encounters with doubtful ſucceſs, completely to ſubdue all his rivals, and finally to eſtabliſh himſelf as ruler of all Perſia. He was in power about 30 years; the latter part of which he governed Perſia under the appellation of *vakeel* or *regent*, for he never would receive the title of Shah. He made Shirauz the chief city of his reſidence, in gratitude for the aſſiſtance he had received from its inhabitants and thoſe of the ſouthern provinces. He died in the year 1779, regretted by all his ſubjects, who eſteemed and honoured him as the glory of Perſia.

59 Kerim Khan enjoyed a reign of near 30 years.

60 Twenty-two officers take poſſeſſion of the citadel.

"When the death of Kerim Khan was announced in the city, much confuſion aroſe; two and twenty of the principal officers of the army, men of high rank and family, took poſſeſſion of the ark, or citadel, with a reſolution to acknowledge Abul Futtah Khan (the eldeſt ſon of the late vakeel) as their ſovereign, and to defend him againſt all other pretenders; whereupon Zikea Khan, a relation of the late vakeel by the mother's ſide, who was poſſeſſed of immenſe wealth, enliſted a great part of the army into his pay, by giving them very conſiderable bounties. Zikea Khan was of the tribe of Zund (or the Leckeian); a man remarkably proud, cruel, and unrelenting. Having aſſembled a large body of troops, he immediately marched them to the citadel, and laid cloſe ſiege to it for the ſpace of three days: at the expiration of which, finding he could not take it by force, he had recourſe to treachery. To each of the principal Khans he ſent a written paper, by which he ſwore upon the Koran, that if they would come out and ſubmit to him, not a hair of their heads ſhould be touched, and that they ſhould have their effects reſtored to them. Upon this a conſultation was held by them; and it appearing that they could not hold out much longer, they agreed to ſurrender themſelves, depending on the promiſes that had been made them. Zikea Khan, in the mean time, gave private orders, for the Khans to be ſeized, and brought ſeparately before him as they came out of the citadel. His orders were ſtrictly obeyed, and theſe deluded men were all maſſacred in his preſence: he was ſeated the whole time, feaſting his eyes on the cruel ſpectacle.

61 Zikea Khan.

62 beſieges the citadel.

63 Employs treacherous means to ſeize the Khans, and was ſucceſsful.

64 Zikea Khan murdered.

"Zikea Khan's tyranny became ſoon intolerable, and he was cut off by his own body guard, when Abul Futtah Khan, who was at the time in the camp, was proclaimed king by the unanimous voice of the troops, whom he immediately led back to Shirauz. On his arrival he was acknowledged as ſovereign by all ranks of people, and took quiet poſſeſſion of the government.

65 Mahomed Sadick Khan attempts to ſeize the government;

"Mahomed Sadick Khan, only brother of the late Kerim Khan, who had during that prince's life filled the high office of beglerbeg of Fars, and had been appointed guardian of his ſon Abul Futtah Khan, was at this period governor of the city of Baſſora, which had been taken by the Perſians, previous to the vakeel's death. Upon hearing the news of his brother's deceaſe he became ambitious of reigning alone, and from that inſtant formed ſchemes for the deſtruction of his nephew; but as it was neceſſary for him to be on the ſpot for the advancement of his views, he determined to withdraw the Perſian garriſon from Baſſora, who were all devoted to his intereſt: accordingly he evacuated that place, and marched immediately for Shirauz.

"The news of Sadick Khan's approach threw the inhabitants of Shirauz into the greateſt conſternation: their minds were variouſly agitated on the occaſion; ſome, from his known public character, expected he would honeſtly fulfil the commands of his deceaſed brother; others, who had been witneſſes to the confuſion of former times, on ſimilar occaſions, rightly imagined that he would ſet up for himſelf; and indeed this proved to be the caſe: for having entered Shirauz a very few days after, he cauſed Abul Futtah Khan to be ſeized, deprived of ſight, and put into cloſe confinement.

66 which he obtains.

"After this event, Sadick Khan openly aſſumed the government. As ſoon as the intelligence reached Ali Murad Khan, who was at Iſpahan, that general inſtantly rebelled: deeming himſelf to have an equal right to the government with Sadick Khan, as in fact he had, he could ill brook the thought of being obedient to him, and openly declared himſelf a competitor for the empire. Perſia was by this means again involved in all the horrors of a civil war. Ali Murad Khan indeed took poſſeſſion of Shirauz, aſſumed the government, and gave to the empire the flattering proſpect of being ſettled under the government of one man; but this proſpect was ſoon obſcured by the power and credit acquired by Aga Mahomed Khan."

67 Aga Mahomed Khan collects troops and ſeizes Mazenderan and Ghilan.

On the night following Kerim Khan's death, this [illegible] man found means to make his eſcape from Shirauz, and fled to the northward, where collecting ſome troops, he ſoon made himſelf maſter of Mazenderan and Ghilan, and was proclaimed king about the time that Ali Murad Khan had taken Shirauz. "It is remarkable (ſays our author), that from his firſt entering into competition for the government, he has been ſucceſsful in every battle which he has fought. He is an eunuch, having been made ſo whilſt an infant, by the command of Nadir Shah, but poſſeſſes great perſonal bravery.

Ali Murad Khan, hearing of the ſucceſs of Aga Mahomed

Mahomed Khan, determined to go againſt him; but as he was previouſly proceeding to Iſpahan to ſuppreſs a rebellion, he fell ſuddenly from his horſe and expired on the ſpot.

68 Jaafar Khan aſſerts his pretenſions to the government. "At this period, Jaafar Khan, the eldeſt and only ſurviving ſon of Sadick Khan, was governor of Khum: he deemed this a favourable opportunity to aſſert his pretenſions to the government, and immediately marched with what few troops he had to Iſpahan: ſoon after his arrival he was joined by the greater part of the malcontents, who were then in arms. In this ſituation he remained ſome time; but Akau Mahomed Khan coming down upon him with his army, he was obliged to riſk his life in a battle, and, being defeated, fled with the ſmall remains of his troops, taking the road to Shirauz. Soon after finding himſelf ſtrengthened by an increaſe of his army, he determined to venture a ſecond engagement with his opponent Akau Mahomed Khan; and for this purpoſe marched with his army towards Iſpahan: the two armies met near Yezdekhaſt, when a battle enſued, and Akau Mahomed Khan's ſuperior fortune again prevailing, Jaafar Khan was defeated, and retired to Shirauz, which he quitted on the 25th of June 1787, and ſhortly after marched his army to the northward, but returned in October without having effected any thing." Such was the ſtate of Perſia in 1788. Mr Franklin, from whoſe excellent Obſervations on a Tour made in the years 1786-7 theſe particulars are moſtly extracted, ſays that Jaafar Khan is the moſt "likely, in caſe of ſucceſs againſt his opponent, to reſtore the country to a happy and reputable ſtate: but it will require a long ſpace of time to recover it from the calamities into which the different revolutions have brought it:—a country, if an oriental metaphor may be allowed, once blooming as the garden of Eden, fair and flouriſhing to the eye;—now, ſad reverſe! deſpoiled and leafleſs by the cruel ravages of war, and deſolating contention."

69 Is defeated by Akau Mahomed Khan.

70 Air and climate of Perſia. As to the air and climate of this country, conſidering the great extent thereof, it cannot but be very different, according to the ſituation of its ſeveral parts; ſome being frozen with cold, whilſt others are burnt with heat at the ſame time of the year. The air, wherever it is cold is dry; but where it is extremely hot, it is ſometimes moiſt. All along the coaſt of the Perſian gulf, from weſt to eaſt, to the very mouth of the river Indus, the heat for four months is ſo exceſſive, that even thoſe who are born in the country, unable to bear it, are forced to quit their houſes, and retire to the mountains; ſo that ſuch as travel in theſe parts, at that ſeaſon, find none in the villages, but wretched poor creatures, left there to watch the effects of the rich, at the expence of their own health. The extreme heat of the air, as it is unſupportable, ſo it makes it prodigiouſly unwholeſome; ſtrangers frequently falling ſick there, and ſeldom eſcaping. The eaſtern provinces of Perſia, from the river Indus to the borders of Tartary, are ſubject to great heats, though not quite ſo unwholeſome as on the coaſts of the Indian ocean and the Perſian gulf; but in the northern provinces, on the coaſt of the Caſpian ſea, the heat is full as great, and, though attended with moiſture, as unwholeſome as on the coaſt before mentioned. From October to May, there is no country in the world more pleaſant than this; but the people carry indelible marks of the malign influence of their ſummers, looking all of them of a faint yellow, and having neither ſtrength nor ſpirits; though, about the end of April, they abandon their houſes, and retire to the mountains, which are 25 or 30 leagues from the ſea. But this moiſtneſs in the air is only in theſe parts; the reſt of Perſia enjoys a dry air, the ſky being perfectly ſerene, and hardly ſo much as a cloud ſeen to fly therein. Though it ſeldom rains, it does not follow that the heat admits of no mitigation: for in the night, notwithſtanding there is not a cloud to be ſeen, and the ſky is ſo clear, that the ſtars alone afford a light ſufficient to travel by, a briſk wind ſprings up, which laſts until within an hour of the morning, and gives ſuch a coolneſs to the air, that a man can bear a tolerable warm garment. The ſeaſons in general, and particularly in the middle of this kingdom, happen thus: the winter, beginning in November, and laſting until March, is very ſharp and rude, attended with froſt and ſnow; which laſt deſcends in great flakes on the mountains, but never in the plains. The climate of Shirauz, the capital of Perſia Proper, is repreſented by a traveller who lately viſited it, as one of the moſt agreeable in the world, the extremes of heat and cold being ſeldom felt. "During the ſpring of the year the face of the country appears uncommonly beautiful. The flowers, of which they have a great variety, and of the brighteſt hues, the fragrant herbs, ſhrubs, and plants, the roſe, the ſweet baſil, and the myrtle, all here contribute to refreſh and perfume the natural mildneſs of the air. The nightingale of the garden (called by the Perſians *boolbul hezar daſtaan)*, the goldfinch, and the linnet, by their melodious warblings at this delightful ſeaſon of the year, ſerve to add to the ſatisfaction of the mind, and to inſpire it with the moſt pleaſing ideas. The beauties of nature are here depicted in their fulleſt extent; the natural hiſtorian and the botaniſt would here meet with ample ſcope for purſuing their favourite inveſtigations. With ſuch advantages, added to the ſalubrity of the air, how can it be wondered at that the inhabitants of Shirauz ſhould ſo confidently aſſert the pre-eminence of their own city to any other in the world?—or that ſuch beauties ſhould fail of calling forth the poetical exertions of a Hafiz, a Sàdi, or a Jàmì? Their mornings and evenings are cool, but the middle of the day is very pleaſant. In ſummer the thermometer ſeldom riſes above 73 in the day time, and at night it generally ſinks as low as 62. The autumn is the worſt ſeaſon of the year, that being the time when the rains begin to fall, and during the autumnal months it is conſidered by the natives as the moſt unhealthy; colds, fluxes, and fevers being very general. In winter a vaſt deal of ſnow falls, and very thick, but ice is rarely to be found, except on the ſummits of the mountains, or towards Iſpahan, and the more northern parts of Perſia. One thing which is moſt to be eſteemed in this country, and renders it preferable to any other part of the world, is their nights, which are always clear and bright: and the dew, that in moſt places is of ſo pernicious and dangerous a nature, is not of the leaſt ill conſequence here: there is none at all in ſummer, and in the other ſeaſons it is of ſuch a nature, that if the brighteſt ſcimitar ſhould be expoſed to it all the night, it would not receive the leaſt ruſt; a circumſtance I have myſelf experienced. This dryneſs in the air cauſes their buildings to laſt a great while, and is undoubtedly

71 Climate of Shirauz.

Perſia. undoubtedly one of the principal reaſons that the celebrated ruins of Perſepolis have endured for ſo many ages, and, comparatively ſpeaking, in ſo perfect a ſtate." The great dryneſs of the air exempts Perſia from thunder and earthquakes. In the ſpring, indeed, there ſometimes falls hail; and, as the harveſt is then pretty far advanced, it does a great deal of miſchief. The rainbow is ſeldom ſeen in this country, becauſe there riſe not vapours ſufficient to form it; but in the night there are ſeen rays of light ſhooting through the firmament, and followed as it were by a train of ſmoke. The winds, however briſk, ſeldom ſwell into ſtorms or tempeſts; but, on the other hand, they are ſometime poiſonous and infectious on the ſhore of the Gulf, as all travellers agree. M. Tavernier ſays, that at Gombroon people often find themſelves ſtruck by a ſouth wind, in ſuch a manner, that they cry, "I burn!" and immediately fall down dead. M. le Brun tells us, that he was aſſured while he was there, that the weather was ſometimes ſo exceſſively ſultry as to melt the ſeals of letters. At this time the people go in their ſhirts, and are continually ſprinkled with cold water; and ſome even lie ſeveral hours naked in the water. Among the inconveniences conſequent from this malign diſpoſition of the air, one of the moſt terrible is the engendering, in the arms and legs, a kind of long ſmall worms, which cannot be extracted without great danger of breaking them; upon which a mortification enſues.

72 Soil. The ſoil of Perſia is in general ſtony, ſandy, barren, and everywhere ſo dry, that, if it be not watered, it produces nothing, not even graſs; but, where they can turn the water into their plains or valleys, it is not unfruitful. There is a great difference in point of fertility in the different provinces of the empire; and thoſe of Media, Iberia, Hyrcania, and Bactria, are now in a great meaſure what they were formerly, and ſurpaſs moſt of the others in their productions. All along the Perſian gulf, the ſoil is ſtill more barren, cattle leſs plenty, and every thing in a worſe condition than anywhere elſe.

73 Produce, Though there is ſcarcely a province in Perſia which does not produce wine, yet the wine of ſome provinces is much more eſteemed than that of others; but Schiras, or, as it is written by Mr Francklin, *Shirauz*, wine is univerſally allowed to be the very beſt in Perſia; inſomuch, that it is a common proverb there, That to live happily one muſt eat the bread of Yezd, and drink the wine of Schiras.

The grain moſt common in Perſia is wheat; which is wonderfully fair and clean. As for barley, rice, and millet, they only make bread of them in ſome places, as in Courdeſtan, when their wheat bread is exhauſted before the return of harveſt. They do not cultivate in this country either oats or rye; except where the Armenians are ſettled, who make great uſe of the latter in Lent. Rice is the univerſal aliment of all ſorts of people in Perſia; for this reaſon they are extremely careful in its cultivation; for, after they have ſown it in the ſame manner as other grain, they in three months time tranſplant it, root by root, into fields, which are well watered, otherwiſe it would never attain that perfection in which we find it there; ſince it is ſofter, ſooner boiled, and more delicious, than the ſame grain in any other part of the world. Perhaps its taſte is, in ſome meaſure, heightened by a practice which they follow to give it a gloſſy whiteneſs, viz. by cleanſing it, after it is beaten out of the huſks, with a mixture of flour and ſalt. Corn ripens exceedingly in this country; ſo that in ſome parts they have a threefold crop in the year. The Perſian bread is generally very thin, white, and good; and commonly cheap enough.

Perſia Metals of all ſorts have been found in Perſia. Since the reign of Shah Abbas the Great, iron, copper, and lead, have been very common; but there are no gold or ſilver mines open at preſent; though, as Perſia is a very mountainous country, ſuch might very probably be found, if pains were taken to ſearch them out. There are ſilver mines in Kerman and Mazanderan, and one not far from Spauhawn; but they cannot be worked for want of wood. Minerals are alſo found in Perſia in abundance; eſpecially ſulphur, ſaltpetre, ſalt, and alum. Nothing is more common in this country than to meet with plains, ſometimes 10 leagues in length, covered entirely with ſalt, and others with ſulphur or alum. In ſome places ſalt is dug out of mines, and even uſed in building houſes. Marble, freeſtone, and ſlate are found in great plenty about Hamadan. The marble is of four colours, viz. white, black, red and black, and white and black. Perſia yields two ſorts of petroleum or naphtha; namely, black and white. In the neighbourhood of Tauris they find azure; but it is not ſo good as that brought from Tartary. Among the moſt valuable productions of Perſia are the precious ſtones called *turquoiſes*, of which there are ſeveral rocks or mines.

The horſes of Perſia are the moſt beautiful of the Eaſt, though they are not ſo much eſteemed as thoſe of Arabia; ſo great, however, is the demand for them, that the fineſt ones will fetch from 90l. to 450l. ſterling. They are higher than the Engliſh ſaddle horſes, ſtraight before, with a ſmall head, legs wonderfully ſlender, and finely proportioned: they are mighty gentle, good travellers, very light and ſprightly, and do good ſervice till they are 18 or 20 years old. The great numbers of them ſold into Turkey and the Indies, though none can be carried out of the kingdom without ſpecial licenſe from the king, is what makes them ſo dear. Next to horſes we may reckon mules, which are much eſteemed here, and are very fine: and next to theſe we may juſtly place aſſes, of which they have in this country two ſorts; the firſt bred in Perſia, heavy and doltiſh, as aſſes in other countries are; the other originally of an Arabian breed, the moſt docile and uſeful creature of its kind in the world. They are uſed wholly for the ſaddle; being remarkable for their eaſy manner of going, and are very ſure-footed, carrying their heads lofty, and moving gracefully. Some of them are valued at 20l. ſterling. The mules here are alſo very fine; they pace well, never fall, and are ſeldom tired. The higheſt price of a mule is about 45l. ſterling. Camels are alſo numerous in Perſia, and very ſerviceable; they call them *kechty-krouch-konion*, i. e. "the ſhips of the land;" becauſe the inland trade is carried on by them as the foreign is by ſhips. Of theſe camels there are two ſorts, the northern and ſouthern: the latter, which is much the ſmaller, but ſwifter, will carry a load of about 700 weight, and trot as faſt as a horſe will gallop; the other will travel with a load of 1200 or 1300 weight; both are profitable to their maſters, as coſting little or nothing to keep. They travel without halter or reins; grazing on the road from time to time, notwithſtanding their load. They are managed entirely by the voice; thoſe who direct them making uſe of a kind of ſong, and the camel moving briſkly, or at its ordinary pace, as they keep a quicker or ſlower time. The camels ſhed their hair ſo clean in the ſpring, that they look like ſcalded ſwine: but then they are pitched over, to keep the flies from ſtinging them. The camels hair is the moſt profitable fleece of all the tame beaſts: fine ſtuffs are made of it; and in Europe, hats, with a mixture of a little beaver.

As beef is little eaten in Perſia, their oxen are generally employed in ploughing, and other ſorts of labour. Hogs are nowhere bred in Perſia, if we except a province or two on the borders of the Caſpian ſea. Sheep and deer are very common throughout all Perſia.

Of wild beaſts, the number is not great in that country, becauſe there are few foreſts; but where there are any, as in Hyrcania, now called *Taberiſtan*, abundance of lions, bears, tygers, leopards, porcupines, wild boars, and wolves, are to be found; but the laſt are not ſo numerous as any of the other ſpecies.

There are but few inſects in this country; which may be aſcribed to the dryneſs of the climate. In ſome provinces, however, there is an infinite number of locuſts or graſhoppers, which fly about in ſuch clouds as to darken the air. In certain parts of the Perſian dominions they have large black ſcorpions, ſo venomous, that ſuch as are ſtung by them die in a few hours. In others they have lizards frightfully ugly, which are an ell long, and as thick as a large toad, their ſkins being as hard and tough as that of the ſea-dog; they are ſaid to attack and kill men ſometimes; but that may be doubted. The ſouthern provinces are infeſted with gnats; ſome with long legs, like thoſe we call *midges*; and ſome white, and as ſmall as fleas, which make no buzzing, but ſting ſuddenly, and ſo ſmartly, that the ſting is like the prick of a needle. Among the reptiles is a long ſquare worm, called by the inhabitants *hazar-pey*, i. e. "thouſand feet," becauſe its whole body is covered with feet; it runs prodigiouſly faſt; and its bite is dangerous, and even mortal if it gets into the ear.

There are in Perſia all the ſeveral ſorts of fowls, which we have in Europe, but not in ſuch great plenty; excepting, however, wild and tame pigeons, of which vaſt numbers are kept all over the kingdom, chiefly on account of their dung: which is the beſt manure for melons. It is a great diverſion among the lower ſort of people in town or country to catch pigeons, though it be forbidden: for this purpoſe they have pigeons ſo taught that flying in one flock, they ſurround ſuch wild ones as they find in the field, and bring them back with them to their maſters. The partridges of this country are the largeſt and fineſt in the world, being generally of the ſize of our fowls. Geeſe, ducks, cranes, herons, and many other ſorts of water fowl, are common here; as are likewiſe nightingales, which are heard all the year, but chiefly in the ſpring; martlets, which learn whatever words are taught them; and a bird called *noura*, which chatters inceſſantly, and repeats whatever it hears. Of birds of a larger ſize, the moſt remarkable is the pelican, by the Perſians called *tacab*, i. e. "water-carrier;" and alſo *miſc*, i. e. "ſheep," becauſe it is as large as one of theſe animals *. There are in Perſia various birds of prey. Some of their falcons are the largeſt and fineſt in the world: the people take great pains to teach them to fly at game; the Perſian lords being great lovers of falconry, and the king having generally 800 of this ſort of birds, each of which has a perſon to attend it.

74 Mountains, rivers, and ſeas.

There is perhaps no country in the world which, generally ſpeaking, is more mountainous than Perſia; but many of them yield neither ſprings nor metals, and but few of them are ſhaded with trees. It is true, ſome of the chief of them are ſituated on the frontiers, and ſerve as a kind of natural ramparts, or bulwarks, to this vaſt empire. Among the latter are the mountains of Caucaſus and Ararat, ſometimes called the *mountains of Dagheſtan*, which fill all the ſpace between the Euxine and Caſpian ſeas: thoſe called *Taurus*, and the ſeveral branches thereof, run through Perſia from Natolia to India, and fill all the middle of the country.

As to rivers, except the Araxes, which riſes in the mountains of Armenia, and falls into the Kur or Cyrus before it reaches the Caſpian ſea, there is not one navigable ſtream in this country. The Oxus divides Perſia on the north-eaſt from Uſbeck Tartary. The Indus alſo may now be reckoned among the rivers of Perſia, as the provinces lying to the weſt of that river are now in poſſeſſion of that crown. This river is ſaid to run a courſe of more than 1000 miles, and overflows all the low grounds in April, May, and June.

The ſeas on the ſouth of Perſia are, the gulf of Perſia or Baſſora, the gulf of Ormus, and the Indian ocean. The only ſea on the north is the Caſpian or Hyrcanian ſea; which is more properly a lake, having no communication with any other ſea. Theſe ſeas, together with the lakes and rivers, ſupply Perſia with plenty of fiſh. The Caſpian ſea contains very fine fiſh on one ſide; and the Perſian gulf on the other is believed to have more fiſh than any other ſea in the world. On the coaſts of this gulf is taken a ſort of fiſh, for which they have no particular name: its fleſh is of a red colour, very delicious, and ſome of them weigh 200 or 300 pounds. The river fiſh are chiefly barbels; but far from being good. Thoſe of the lakes are carps and ſhads. In the river at Spauhawn are a great number of crabs, which crawl up the trees, and live night and day under the leaves, whence they are taken; and are eſteemed very delicious food.

75 Iſlands, &c. in the Perſian gulf.

In his voyage from Gombroon up the Perſian gulf, Mr Ives makes mention of ſeveral iſlands, named Kiſme, Polloar, Kyes, Inderabie, Shittewar, and Buſheel. Some of theſe were quite barren; on others there were a few trees and buſhes, with little fiſhing towns, and a few ſmall veſſels lying along ſhore. The date trees were thinly ſcattered among the hills; but though a ſmall portion of green might here and there be diſcovered, yet ſuch was the barrenneſs of theſe iſlands in general, that it was for ſome time a matter of ſurpriſe how ſheep and goats could poſſibly ſubſiſt upon them. On cloſer examination, however, it was found, that the ſoil produced a kind of ſmall leaved juicy mallows, on which theſe animals principally feed. The Perſian coaſt, as they ſailed along, afforded a moſt romantic proſpect, appearing at firſt to be one continued rock, rent and torn aſunder by earthquakes; but it was afterwards diſcovered, that ſome part of it was only ſand hardened by the rains and ſun.

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* See *Pelecanus*, ORNITHOLOGY *Index*.

Nabon Point terminates in a long and low piece of land, which runs out into the gulf from the foot of the Perſian coaſt. Between this point and the main land is a channel, in which a ſhip of 500 tons burden might eaſily ride. The Portugueſe had formerly a ſettlement here, the remains of which are ſtill to be ſeen. A large river empties itſelf into the ſea at this place: and Mr Ives obſerves, that "Providence ſeems here to have allotted a ſpot of ground amidſt unhoſpitable rocks and deſerts, capable of affording the kind production of vegetables for man and beaſt." The adjacent country is ſubject to the Arabs.

Through all the Perſian gulf Mr Ives remarks, that the ſpring water on the iſlands is much better than that on the continent; and the water neareſt the ſea on the iſlands has greatly the advantage over that which is found in the middle parts. This holds good, however, only in thoſe parts which are near the ſea; for about 12 miles up the country, both on the Perſian and Arabian ſides of the gulf, the water is very good. At the iſland called Bahreen or Bahrein, divers go down to the bottom of the ſea, at certain known depths, and come up again with their veſſels filled with freſh water. This freſh water is found in holes or little natural wells, ſome fathoms below the ſurface of the ſea. The Arabs have certain marks on the iſland to teach them where to dive for the freſh water. Mr Ives was aſſured by an Arabian merchant, that he himſelf had diſcovered a ſpring upon the ſhore, by which one of theſe wells are ſerved. He put into this ſpring a bit of heavy ſtick; and in two or three days an Arabian diver brought it to him again from the bottom of one of theſe holes.

76 Trade.

The Engliſh and other nations, trade with the Perſians ſeveral ways, particularly by the gulf of Ormus at Gombroon, and by the way of Turkey: A trade alſo was not many years ſince opened by the Engliſh with Perſia through Ruſſia and the Caſpian ſea; but that is now diſcontinued, having been prohibited by the court of Ruſſia, who were apprehenſive that the Engliſh would teach the Perſians to build ſhips, and diſpute the navigation of the Caſpian ſea with them. The principal commodities and manufactures of Perſia are raw and wrought ſilks, mohair camblets, carpets, leather; for which, and ſome others the European merchants exchange chiefly woollen manufactures; but the trade is carried on altogether in European ſhipping, the Perſians have ſcarce any ſhips of their own, and the Ruſſians the ſole navigation of the Caſpian ſea. There is not a richer or more profitable trade in the world, than that which is carried on between Gombroon and Surat in the Eaſt Indies; and the Engliſh Eaſt India Company frequently let out their ſhips to tranſport the merchandiſe of the Banians and Armenians from Perſia to India. The ſhah or ſovereign of Perſia, is the chief merchant; and he uſually employs his Armenian ſubjects to traffic for him in every part of the world. The king's agents muſt have the refuſal of all merchandiſe, before his ſubjects are permitted to trade. It is computed that Perſia produces yearly upwards of 22,000 bales of ſilk, chiefly in the provinces of Ghilan and Mazanderan, each bale weighing 263 pounds. Vaſt quantities of Perſian ſilk uſed to be imported into Europe, eſpecially by the Dutch, Engliſh, and Ruſſians, before the civil wars began. The goods exported from Perſia to India are, tobacco, all ſorts of fruits, pickled and preſerved, eſpecially dates, marmalade, wines, diſtilled waters, horſes, Perſian feathers, and Turkey leather of all ſorts and colours, a great quantity whereof is alſo exported to Muſcovy and other European countries. The exports to Turkey are, tobacco, galls, thread, goats hair, [illegible], mats, box work, and many other things. As there are no poſts in the country, and trading by commiſſion with the uſe of bills of exchange, is little known, traffic muſt proceed in a very awkward heavy manner, in compariſon of that of Europe.

77 Coin.

The moſt current money of Perſia are the abaſſees, worth about 1s. 4d. ſterling: they are of the fineſt ſilver. An abaſſee is worth two mahmoudies; a mahmoudie, two ſhahees; and a ſhahee, ten ſingle or five double caſbeghes: theſe laſt pieces are of braſs, the others of ſilver; for gold is not current in trade. The ſhahees are not very common; but mahmoudies and caſbeghes are current everywhere. Lands, cattle, houſes, &c. are generally ſold by the toman, which is an imaginary coin, worth 200 ſhahees, or 50 abaſſees; and they uſually reckon their eſtates that way. Such a one, they ſay, is worth ſo many tomans, as we ſay pounds in England.

78 Government.

Perſia is an abſolute monarchy, the lives and eſtates of the people being entirely at the diſpoſal of their prince. The king has no council eſtabliſhed, but is adviſed by ſuch miniſters as are moſt in favour; and the reſolutions taken among the women of the haram frequently defeat the beſt laid deſigns. The crown is hereditary, excluding only the females. The ſons of a daughter are allowed to inherit. The laws of Perſia exclude the blind from the throne; which is the reaſon that the reigning prince uſually orders the eyes of all the males of the royal family, of whom he has any jealouſy, to be put out. The king has generally a great many wives, which it would be death for any one beſides the eunuchs, who have the ſuperintendance of them, to look at, or even ſee by accident; wherefore, when he travels, notice is given to all men to quit the road, nay their very houſes, and to retire to a great diſtance.

The prime miniſter is called *attemaet doulet*, which ſignifies the director of the empire, and alſo *vizir azem*, or the great ſupporter of the empire; as he alone almoſt ſuſtains the whole weight of the adminiſtration. This miniſter's chief ſtudy is to pleaſe his maſter, to ſecure to himſelf an aſcendant over his mind, and to avoid whatever may give him any uneaſineſs or umbrage. With this view, he never fails to flatter him, to extol him above all the princes upon earth, and to throw a thick veil over every thing that might help to open his eyes, or diſcover to him the weakneſs of the ſtate. He even takes particular care to keep the king in utter ignorance; to hide from him, or at leaſt to ſoften, all unwelcome news; and; above all, to exalt immoderately every the leaſt advantage he obtains over his enemies. As he takes theſe methods, which indeed are and muſt be taken, more or leſs, by the miniſters of every deſpotic prince, to ſecure the favour and confidence of his maſter; ſo the inferior officers and governors of provinces are obliged to employ all the means in their power to ſecure the prime miniſter's, they depending no leſs upon him than he does upon the king.

There is a gradation of deſpotiſm and ſlavery, down from the prime miniſter to the loweſt retainer to the court, or dependent on the government. Children are ſometimes in Perſia required by the king to cut off the ears and noſe, and even to cut the throats of their parents; and theſe orders cannot be objected to, without endangering their own lives. Indeed their baſeneſs and mercenarineſs are ſuch, that they will perpetrate ſuch atrocious deeds without the leaſt ſcruple or difficulty, when they have a promiſe or expectation of poſſeſſing their poſts. The prime miniſters, notwithſtanding the precarious footing on which they ſtand, in effect of their abilities or good fortune, ſometimes continue in their employments during life, or, if removed, are only baniſhed to ſome city, where they are allowed to ſpend the remainder of their days in a private ſtation.

Next to the prime miniſter are the nadir, or grandmaſter of the houſehold; the mehter, or groom of the chambers, who is always a white eunuch; the mirakbor baſhe, or maſter of the horſe; the mir-ſhikar baſhe, or great huntſman and falconer; the divanbeggi, or chief juſtice, to whom there lies an appeal from the deroga, or the lieutenant of police, in every town; the vacka nuviez, or recorder of events, or firſt ſecretary of ſtate; the muſlau-ſhe-elmenaleck, or maſter of the accounts and finances of the kingdom; the numes humbaſhes, or the king's chief phyſicians; the ſhickada-ſibaſhe, or inſpector of the palace, and regulator of rank at court; and the khans, or governors of provinces, under whom are other governors, called *ſoltans*, appointed alſo by the king.

Civil matters are all determined by the cazi, and eccleſiaſtical ones (particularly divorces) by the ſheick-elſelleum, or head of the faith; an officer anſwering to the mufti among the Turks; under him are the ſheick-elſelom, and cadi, who decide in all matters of religion, and make all contracts, teſtaments, and other public deeds, being appointed by the king in all the principal towns; and next to theſe are the pichnamas, or directors of the prayers; and the moullahs, or doctors of the law.

Juſtice is carried on in Perſia in a very ſummary manner; the ſentence, whatever it may be, being always put into execution on the ſpot. Theft is generally puniſhed with the loſs of noſe and ears; robbing on the road, by ripping up the belly of the criminal, in which ſituation he is expoſed upon a gibbet in one of the moſt public parts of the city, and there left until he expires in torment.

There is no nobility in Perſia, or any reſpect ſhown to a man on account of his family, except to thoſe who are of the blood of their great prophet or patriarchs; but every man is eſteemed according to the poſt he poſſeſſes; and when he is diſmiſſed, he loſes his honour, and he is no longer diſtinguiſhed from the vulgar.

With reſpect to the forces of Perſia, their two bodies, called the *Kortſhies* and *Goulans*, that ſerve on horſeback, are well kept and paid, and may amount, the former to about 22,000, and the latter to about 18,000. The Kortſhies are deſcended from an ancient but foreign race; and the Goulans are either Georgian renegadoes or ſlaves, or the children of ſlaves of all nations. The infantry, called *Tangtchies*, are picked out from among the moſt robuſt and vigorous of the peaſants, and compoſe a body of 40,000 or 50,000. The Perſians have few fortified towns, and had no ſhips of war, till Kouli Khan built a royal navy, and among them had a man of war of 80 guns; but ſince the death of that uſurper, we hear no more of their fleet.

The arms of the king of Perſia are a lion couchant, looking at the ſun as he riſes over his back. His uſual title is *Shaw* or *Patſhaw*, the "diſpoſer of kingdoms." They add alſo to the king's titles thoſe of *ſultan*, and *chan* or *cham*, which is the title of the Tartar ſovereigns. To acts of ſtate the Perſian monarch does not ſubſcribe his name; but the grant runs in this manner, viz. *This act, or edict, is given by him whom the univerſe obeys.*

79 Manners, &c. The ancient Perſians are known to have been exceedingly voluptuous and effeminate. After the conqueſt of the empire by Alexander, the Greek diſcipline and martial ſpirit being in part communicated to them, they became much more formidable; and hence the Parthians were found to be a match not only for the Syro-Macedonian princes, but even for the Romans. Of their manners we know little or nothing, but that to their valour and military ſkill they joined in a ſurpriſing degree all the luxury and diſſipation of the ancient Perſians.

The modern Perſians, like the Turks, plundering all the adjacent nations for beauties to breed by, are men of a good ſtature, ſhape, and complexion; but the Gaures, or ancient Perſians, are homely, ill-ſhaped, and clumſy, with a rough ſkin, and olive complexions. In ſome provinces, not only the complexions but the conſtitutions of the inhabitants, ſuffer greatly by the extreme heat and unwholeſomeneſs of the air. The Perſian women, too, are generally handſome and well-ſhaped, but much inferior to thoſe of Georgia and Circaſſia. The men wear large turbans on their heads, ſome of them very rich, interwoven with gold and ſilver; a veſt, girt with a ſaſh; and over it a looſe garment, ſomething ſhorter; with ſandals, or ſlippers, on their feet. When they ride, which they do every day, if it be but to a houſe in the ſame town, they wear pliant boots of yellow leather; the furniture of their horſes is extremely rich, and the ſtirrups generally of ſilver: whether on horſeback or on foot, they wear a broad ſword and a dagger in their ſaſh. The dreſs of the women does not differ much from that of the men; only their veſts are longer, and they wear ſtiffened caps on their heads, and their hair down.

With reſpect to outward behaviour, ſays an intelligent traveller, "The Perſians are certainly the Pariſians of the Eaſt. Whilſt a rude and inſolent demeanor peculiarly marks the character of the Turkiſh nation towards foreigners and Chriſtians, the behaviour of the Perſians would, on the contrary, do honour to the moſt civilized nations: they are kind, courteous, civil, and obliging, to all ſtrangers, without being guided by thoſe religious prejudices ſo very prevalent in every other Mahometan nation; they are fond of inquiring after the manners and cuſtoms of Europe, and in return very readily afford any information in reſpect to their own country. The practice of hoſpitality is with them ſo grand a point, that a man thinks himſelf highly honoured if you will enter his houſe and partake of what the family affords; whereas, going out of a houſe without ſmoking a calean, or taking any other refreſhment, is deemed in Perſia a high affront."

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Perſia.

Their uſual drink is water and ſherbet, as in other Mahometan countries, wine being prohibited; but of all Mahometan nations they pay the leaſt regard to this prohibition. Many of them drink wine publicly, and almoſt all of them in private (excepting thoſe who have performed the pilgrimage to Mecca, and eccleſiaſtics): they alſo are very liable to be quarrelſome when inebriated, which is often attended with fatal conſequences. They eat opium, but in much leſs quantities than the Turks; and indeed in every thing they ſay or do, eat or drink, they make a point to be as different from this nation as poſſible, whom they deteſt to a man, beyond meaſure; eſteeming Jews and Chriſtians ſuperior to them, and much nearer to ſalvation.

80 necdotes their re- gion.

Every one knows, that the religion of the Perſians is Mahometan; and that they are of the ſect of Ali, for whom they entertain the moſt extravagant veneration. Mr Francklin heard one of his guides on the road reprove another for the expreſſion *O God! O Ali!* "No, no, (ſaid his zealous companion), *Ali firſt, God ſecond!*" This attachment is the ſource of their hatred to the Turks, and of many ſtrange cuſtoms among themſelves, which we have not room to enumerate; a few, however, muſt be mentioned.

"Their mode of living is as follows: They always riſe at daybreak, in order to perform their devotions. Their firſt prayer is denominated *numaz ſoobh*, or the morning prayer; it is ſaid before ſunriſe, after which they eat a ſlight meal called *nàſhta* or breakfaſt; this conſiſts of grapes, or any other fruits of the ſeaſon, with a little bread, and cheeſe made of goats milk; they afterwards drink a cup of very ſtrong coffee without milk or ſugar; then the calean or pipe is introduced. The Perſians, from the higheſt to the loweſt ranks, all ſmoke tobacco.

"Their ſecond hour of prayer is called *numaz zòhur*, or mid-day prayer, and is always repeated when the ſun declines from the meridian. Their dinner, or *chaſht*, which is ſoon after this prayer, conſiſts of curds, bread, and fruits of various kinds; animal food not being uſual at this meal.

"The third hour of prayer is called *numaz àſur*, or the afternoon prayer, ſaid about four o'clock.

"The fourth hour of prayer is *numaz ſhàm*, or evening prayer, which is ſaid after ſunſet; when this is finiſhed, the Perſians eat their principal meal, called *ſhàmi* or ſupper. This generally conſiſts of a pilau, dreſſed with rich meat ſauces, and highly ſeaſoned with various ſpices: ſometimes they eat *kibaàb* or roaſt meat. When the meal is ready, a ſervant brings notice thereof, and at the ſame time preſents a ewer and water; they then waſh their hands, which is an invariable cuſtom with the Perſians both before and after eating. They eat very quick, conveying their food to their mouths with their fingers; the uſe of knives and forks being unknown in Perſia. Sherbets of different ſorts are introduced, and the meal concludes with a deſert of delicious fruits. The ſupper being finiſhed, the family ſit in a circle, and entertain each other by relating pleaſant ſtories (of which they are exceſſively fond), and alſo by repeating paſſages from the works of their moſt favourite poets, and amuſing themſelves at various kinds of games. The fifth and laſt prayer is ſtyled *numaz akhir*, the laſt prayer; or ſometimes *numaz ſhib*, or the night prayer, repeated about an hour after ſupper."

Perſia
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Perſica.

81 Remarkable law reſpecting marriage.

The moſt remarkable law among the Perſians reſpects marriage. A man may divorce his wife when he chooſes, without aſſigning any other reaſon for the divorce than that it is his pleaſure. If he ſhould change his mind, he may again marry her, divorce her a ſecond time, and a third time marry her: but here this privilege ſtops. No man is allowed to marry the woman whom he has thrice divorced. A widow is obliged to mourn four months for her deceaſed huſband before ſhe can be married to another; but a concubine may form a new connection the inſtant that her keeper expires.

82 Ceremony of naming their children.

At the naming of children in Perſia, Mr Francklin informs us that the following ceremony is obſerved: "The third or fourth day after the child is born, the friends and relations of the woman who has lain-in aſſemble at her houſe, attended by muſic and dancing girls hired for the occaſion; after playing and dancing ſome time, a mullah or prieſt is introduced, who, taking the child in his arms, demands of the mother what name ſhe chooſes the infant ſhould be called by; being told, he begins praying, and after a ſhort time applies his mouth cloſe to the child's ear, and tells him diſtinctly three times (calling him by name) to remember and be obedient to his father and mother, to venerate his Koran and his prophet, to abſtain from thoſe things which are unlawful, and to practiſe thoſe things which are good and virtuous. Having repeated the Mahometan profeſſion of faith, he then redelivers the child to his mother; after which the company are entertained with ſweetmeats and other refreſhments, a part of which the females preſent always take care to carry away in their pockets, believing it to be the infallible means of their having offspring themſelves."

83 Intellectual excellence.

The Perſians excel more in poetry than any other ſort of literature; and aſtrologers are now in as great reputation in Perſia as the magi were formerly. Their books are all manuſcripts, the art of printing having not yet been introduced among them: they excel indeed in writing, and have eight different hands. They write from the right hand to the left, as the Arabs do. In their ſhort hand, they uſe the letters of the alphabet; and the ſame letters, differently pointed, will have 20 different ſignifications. In ſhort, the Perſians are born with as good natural parts as any people in the Eaſt, but make a bad uſe of them; being great diſſemblers, cheats, liars, and flatterers, and having a ſtrong propenſity to voluptuouſneſs, luxury, idleneſs, and indolence; vices indeed to which the Aſiatics in general are much addicted.

PERSIAN WHEEL. See HYDRODYNAMICS.

PERSICA, the PEACH, is by Linnæus referred to the ſame claſs and genus with amygdalus. There is a great variety of peach trees planted in the gardens, ſome of which are preſerved only for the beauty of their flowers, but moſt of them for the ſake of the fruit. Of thoſe remarkable for the beauty of their flowers the principal are, 1. The vulgaris, or common peach-tree, with double flowers, which is a very great ornament in gardens, producing very large double flowers of a beautiful red or purple colour, and growing to a conſiderable ſize. 2. The humilis, or dwarf-almond. 3. The africana, or double-flowering dwarf-almond. Theſe two reach not above the height of three or four feet, though their flowers are of equal beauty with the former.

Of the peach-trees cultivated for the ſake of their fruit there is a great number. They are raiſed from the ſtones of the fruit, which ſhould be planted in autumn on a bed of light dry earth, about three inches deep and four inches aſunder. In the winter the beds ſhould be covered with mulch to protect them from the froſt. In this bed they ſhould remain for a year; when they are to be taken up and planted in a nurſery, where they are to remain one or two years; after which they muſt be removed to the places where they are to continue.

PERSICARIA. See POLYGONUM, BOTANY *Index*.

PERSICUS SINUS, in *Ancient Geography*, (Mela, Pliny); a part of the ſea which the Romans called *Mare Rubrum*, and the Greeks *Mare Erythræum*; waſhing Arabia Felix on the eaſt, between which and Carmania, entering into the land, it waſhes Perſia on the ſouth. Its large mouth conſiſts of ſtraight ſides, like a neck, and then the land retiring equally a vaſt way, and the ſea ſurrounding it in a large compaſs of ſhore, there is exhibited the figure of a human head (Mela). Theophraſtus calls this bay *Sinus Arabicus*, a name it equally claims with *Perſicus*, only for diſtinction ſake *Perſicus* is appropriated to it by others.

PERSIMON. See DIOSPYROS, BOTANY *Index*.—From the perſimon is made a very palatable liquor in the following manner: As ſoon as the fruit is ripe, a ſufficient quantity is gathered, which is very eaſy, as each tree is well ſtocked with them. Theſe perſimon apples are put into a dough of wheat or other flour, formed into cakes, and put into an oven, in which they continue till they are quite baked and ſufficiently dry, when they are taken out again: then, in order to brew the liquor, a pot full of water is put on the fire, and ſome of the cakes are put in: theſe become ſoft by degrees as the water grows warm, and crumble in pieces at laſt; the pot is then taken from the fire, and the water in it well ſtirred about, that the cakes may mix with it: this is then poured into another veſſel, and they continue to ſteep and break as many cakes as are neceſſary for a brewing: the malt is then infuſed, and they proceed as uſual with the brewing. Beer thus prepared is reckoned much preferable to other beer. They likewiſe make brandy of this fruit in the following manner: having collected a ſufficient quantity of perſimons in autumn, they are altogether put into a veſſel, where they lie for a week till they are quite ſoft: then they pour water on them, and in that ſtate they are left to ferment of themſelves, without promoting the fermentation by any addition. The brandy is then made in the common way, and is ſaid to be very good, eſpecially if grapes (in particular of the ſweet ſort), which are wild in the woods, be mixed with the perſimon fruit. Some perſimons are ripe at the end of September, but moſt of them later, and ſome not before November and December, when the cold firſt overcomes their acrimony. The wood of this tree is very good for joiners inſtruments, ſuch as planes, handles to chiſels, &c. but if after being cut down it lies expoſed to ſunſhine and rain, it is the firſt wood which rots, and in a year's time there is nothing left but what is uſeleſs. When the perſimon trees get once into a field, they are not eaſily got out of it again, as they ſpread much.

PERSIS, a Roman lady, whom St Paul ſalutes in his epiſtle to the Romans (xvi. 12.), and whom he calls his beloved ſiſter. He ſays ſhe has laboured much for the Lord, and ſtill labours. Nothing elſe of her life is come to our knowledge, nor do we know that ſhe is honoured by any church; which is ſomething ſingular.

PERSIUS FLACCUS, AULUS, a Latin poet in the reign of Nero, celebrated for his ſatires. He was born, according to ſome, at Volterra in Tuſcany; and according to others, at Tigulia, in the gulf Della Specia, in the year 34. He was educated till 12 years old at Volterra; and afterwards continued his ſtudies at Rome under Palæmon the grammarian, Virginius the rhetorician, and Cornutus the Stoic philoſopher, who contracted a friendſhip for him. Perſius conſulted that illuſtrious friend in the compoſition of his verſes. Lucian alſo ſtudied with him under Cornutus; and appeared ſo charmed with his verſes, that he was inceſſantly breaking out into acclamations at the beautiful paſſages in his ſatires: an example rarely ſeen in poets of equal rank. He was a ſteady friend, a good ſon, an affectionate brother and parent. He was chaſte, meek, and modeſt: which ſhows how wrong it is to judge of a man's morals by his writings; for the ſatires of Perſius are not only licentious, but ſharp and full of bitterneſs. He wrote but ſeldom; and it was ſome time before he applied himſelf regularly to it.

Perſius was of a weak conſtitution, and troubled with a bad ſtomach, which was the cauſe of his death in the 30th year of his age. Six of his ſatires remain; in their judgements of which the critics have been much divided, excepting as to their obſcurity, Perſius being indeed the moſt obſcure of all the Latin poets. As a poet, he is certainly inferior to Horace and Juvenal; and all the labours of Iſaac Caſaubon, who has written a moſt learned and elaborate commentary upon him, cannot make him equal to either of them as a ſatiriſt, though in virtue and learning he exceeded them both. He was a profeſſed imitator of Horace; yet had little of Horace's wit, eaſe, and talent at ridicule. His ſtyle is grand, figurative, poetical, and ſuitable to the dignity of the Stoic philoſophy: and hence he ſhines moſt in recommending virtue and integrity: here it is that ſatire becomes him. He was too grave to court the muſes with ſucceſs: but he had a great ſoul, ſuſceptible of noble ſentiments, which give a grace but to indifferent poetry. His cotemporaries thought highly of him. Quintilian allows, that Perſius, although he wrote but one book of ſatires, acquired a great deal of true glory, *Multum et veræ gloriæ quamvis uno libro Perſius meruit*: and Martial ſays much the ſame thing, *Sæpius in libro memoratur Perſius uno*, &c.

PERSON, an individual ſubſtance of a rational intelligent nature. Thus we ſay, an ambaſſador repreſents the perſon of his prince; and that, in law, the father and ſon are reputed the ſame perſon.

The word *perſon*, *perſona*, is thought to be borrowed *à perſonando*, from perſonating or counterfeiting; and is ſuppoſed to have firſt ſignified a maſk: becauſe, as Boethius informs us, *in larva concava ſonus volvatur*: and hence the actors who appeared maſked on the ſtage were ſometimes called *larvati* and ſometimes *perſonati*. He likewiſe ſays, that as the ſeveral actors repreſented each a ſingle individual perſon, viz. Œdipus, or Chremes, or

Perſona
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Perſonal.

or Hecuba, or Medea; for this reaſon, other people, who were at the ſame time diſtinguiſhed by ſomething in their form, character, &c. whereby they might be known, came likewiſe to be called by the Latins *perſonæ*, and by the Greeks πρόσωπα. Again, as actors rarely repreſented any but great and illuſtrious characters, the word came at length to import the mind, as being that whoſe diſpoſitions conſtitute the character. And thus men, angels, and even God himſelf, were called *perſons*. Things merely corporeal, as a ſtone, a plant, or a horſe, were called *hypoſtaſes* or *ſuppoſita*, but never *perſons*. Hence the learned ſuppoſe, that the ſame name *perſon* came to be uſed to ſignify ſome dignity, whereby a *perſon* is diſtinguiſhed from another; as a father, huſband, judge, magiſtrate, &c. In this ſenſe we are to underſtand that of Cicero: "Cæſar never ſpeaks of Pompey, but in terms of honour and reſpect: he does many hard and injurious things, however, againſt his perſon."

Perſon we have already defined to mean an individual ſubſtance of a reaſonable nature. Now a thing may be individual two ways: 1. Logically, becauſe it cannot be predicated of any other; as Cicero, Plato, &c. 2. Phyſically; in which ſenſe a drop of water, ſeparated from the ocean, may be called an individual. Perſon is an individual nature in each of theſe ſenſes; logically, according to Boethius, becauſe *perſon* is not ſpoken of univerſals, but only of ſingulars and individuals; we do not ſay the *perſon* of an animal or a man, but of Cicero and Plato: and phyſically, ſince Socrates's hand or foot are never conſidered as perſons. This laſt kind of individual is denominated two ways: poſitively, when the perſon is ſaid to be the whole principle of acting; for to whatever thing action is attributed, that the philoſophers call a *perſon*: and negatively, as when we ſay, with the Thomiſts, &c. that a perſon conſiſts in this, that it does not exiſt in another as a more perfect being. Thus a man, though he conſiſts of two different things, viz. body and ſpirit, is not two perſons; becauſe neither part of itſelf is a complete principle of action, but one perſon, ſince the manner of his conſiſting of body and ſpirit is ſuch as conſtitutes one whole principle of action; nor does he exiſt in any other as a more perfect being; as, for example, Socrates's foot does in Socrates, or a drop of water in the ocean.

Person, in *Grammar*, a term applied to ſuch nouns or pronouns as, being either prefixed or underſtood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite or perſonal verbs. See Grammar.

PERSONAL, any thing that concerns, or is reſtrained to, the perſon: thus it is a maxim in ethics, that all faults are perſonal.

Personal Action, in *Law*, is an action levied directly and ſolely againſt the perſon; in oppoſition to a real or mixed action. See Action.

Personal Goods, or *Chattels*, in *Law*, ſignifies any moveable thing belonging to a perſon, whether alive or dead. See Chattels.

Personal Identity. See Metaphysics, Part III. Chap. iii.

Personal Verb, in *Grammar*, a verb conjugated in all the three perſons; thus called in oppoſition to an imperſonal verb, or that which has the third perſon only.

Perſonality
||
Perſonifying.

PERSONALITY, in the ſchools, is that which conſtitutes an individual a diſtinct perſon.

PERSONATÆ, is the name of the 40th order in Linnæus's Fragments of a Natural Method, conſiſting of a number of plants whoſe flowers are furniſhed with an irregular gaping or grinning petal, which in figure ſomewhat reſembles the ſnout of an animal. The bulk of the genera of this natural order arrange themſelves under the claſs and order didynamia angioſpermia of the Sexual Method.

The reſt, although they cannot enter into the artificial claſs juſt mentioned, for want of the claſſic character, the inequality of the ſtamina; yet, in a natural method, which admits of greater latitude, may be arranged with thoſe plants which they reſemble in their habit and general appearance, and particularly in the circumſtances expreſſed in that title.

PERSONIFYING, or Personalizing, the giving an inanimate being the figure, ſentiments, and language of a perſon.

Dr Blair, in his Lectures on Rhetoric, gives this account of perſonification. "It is a figure, the uſe of which is very extenſive, and its foundation laid deep in human nature. At firſt view, and when conſidered abſtractly, it would appear to be a figure of the utmoſt boldneſs, and to border on the extravagant and ridiculous. For what can ſeem more remote from the track of reaſonable thought, than to ſpeak of ſtones and trees, and fields and rivers, as if they were living creatures, and to attribute to them thought and ſenſation, affections and actions? One might imagine this to be no more than childiſh conceit, which no perſon of taſte could reliſh. In fact, however, the caſe is very different. No ſuch ridiculous effect is produced by perſonification when properly employed; on the contrary, it is found to be natural and agreeable, nor is any very uncommon degree of paſſion required in order to make us reliſh it. All poetry, even in its moſt gentle and humble forms, abounds with it. From proſe it is far from being excluded; nay, in common converſation, very frequent approaches are made to it. When we ſay, the ground *thirſts* for rain, or the earth *ſmiles* with plenty; when we ſpeak of ambition's being *reſtleſs*, or a diſeaſe being *deceitful*; ſuch expreſſions ſhow the facility with which the mind can accommodate the properties of living creatures to things that are inanimate, or to abſtract conceptions of its own forming.

"Indeed, it is very remarkable, that there is a wonderful proneneſs in human nature to animate all objects. Whether this ariſes from a ſort of aſſimilating principle, from a propenſion to ſpread a reſemblance of ourſelves over all other things, or from whatever other cauſe it ariſes, ſo it is, that almoſt every emotion which in the leaſt agitates the mind beſtows upon its object a momentary idea of life. Let a man, by an unwary ſtep, ſprain his ankle, or hurt his foot upon a ſtone, and in the ruffled diſcompoſed moment he will ſometimes feel himſelf diſpoſed to break the ſtone in pieces, or to utter paſſionate expreſſions againſt it, as if it had done him an injury. If one has been long accuſtomed to a certain ſet of objects, which have made a ſtrong impreſſion on his imagination; as to a houſe, where he has paſſed many agreeable years; or to fields, and trees, and mountains, among which he has often walked with the greateſt delight; when he is obliged to part with them, eſpecially if he has no proſpect of ever ſeeing them again, he can ſcarce avoid having ſomewhat of the ſame feeling as when he is leaving old friends. They ſeem endowed with life. They became objects of his affection; and, in the moment of his parting, it ſcarce ſeems abſurd to him to give vent to his feeling in words, and to take a formal adieu.

" So ſtrong is that impreſſion of life which is made upon us, by the more magnificent and ſtriking objects of nature eſpecially, that I doubt not in the leaſt of this having been one cauſe of the multiplication of divinities in the heathen world. The belief of dryads and naiads, of the genius of the wood and the god of the river, among men of lively imaginations, in the early ages of the world, eaſily aroſe from this turn of mind. When their favourite rural objects had often been animated in their fancy, it was an eaſy tranſition to attribute to them ſome real divinity, ſome unſeen power or genius which inhabited them, or in ſome peculiar manner belonged to them. Imagination was highly gratified, by thus gaining ſomewhat to reſt upon with more ſtability; and when belief coincided ſo much with imagination, very ſlight cauſes would be ſufficient to eſtabliſh it.

" From this deduction may be eaſily ſeen how it comes to paſs that perſonification makes ſo great a figure in all compoſitions where imagination or paſſion have any concern. On innumerable occaſions it is the very language of imagination and paſſion; and therefore deſerves to be attended to, and examined with peculiar care. There are three different degrees of this figure, which it is neceſſary to remark and diſtinguiſh, in order to determine the propriety of its uſe. The firſt is, when ſome of the properties or qualities of living creatures are aſcribed to inanimate objects; the ſecond, when thoſe inanimate objects are introduced as acting like ſuch as have life; and the third, when they are repreſented either as ſpeaking to us, or as liſtening to what we ſay to them."

The ingenious profeſſor goes on to inveſtigate the nature of perſonification at conſiderable length. We ſhall give his caution for the uſe of it in proſe compoſitions, in which he informs us this figure requires to be uſed with great moderation and delicacy. " The ſame liberty is not allowed to the imagination there as in poetry. The ſame aſſiſtances cannot be obtained for raiſing paſſion to its proper height by the force of numbers and the glow of ſtyle. However, addreſſes to inanimate objects are not excluded from proſe; but have their place only in the higher ſpecies of oratory. A public ſpeaker may on ſome occaſions very properly addreſs religion or virtue; or his native country, or ſome city or province, which has ſuffered perhaps great calamities, or been the ſcene of ſome memorable action. But we muſt remember, that as ſuch addreſſes are among the higheſt efforts of eloquence, they ſhould never be attempted unleſs by perſons of more than ordinary genius: for if the orator fails in his deſign of moving our paſſions by them, he is ſure of being laughed at. Of all frigid things, the moſt frigid are the aukward and unſeaſonable attempts ſometimes made towards ſuch kinds of perſonification, eſpecially if they be long continued. We ſee the writer or ſpeaker toiling and labouring to expreſs the language of ſome paſſion which he neither feels himſelf nor can make us feel. We remain not only cold, but frozen; and are at full leiſure to criticiſe on the ridiculous figure which the perſonified object makes, when we ought to have been tranſported with a glow of enthuſiaſm. Some of the French writers, particularly Boſſuet and Flechier, in their ſermons and funeral orations, have attempted and executed this figure not without warmth and dignity. Their works are exceedingly worthy of being conſulted for inſtances of this and of ſeveral other ornaments of ſtyle. Indeed the vivacity and ardour of the French genius is more ſuited to this bold ſpecies of oratory, than the more correct but leſs animated genius of the Britiſh, who in their proſe works very rarely attempt any of the high figures of eloquence."

PERSPECTIVE.

PERSPECTIVE is the art of drawing on a plane ſurface true reſemblances or pictures of objects, as the objects themſelves appear to the eye from any diſtance and ſituation, real or imaginary.

It was in the 16th century that *Perſpective* was revived, or rather reinvented. It owes its birth to painting, and particularly to that branch of it which was employed in the decorations of the theatre, where landſcapes were properly introduced, and which would have looked unnatural and horrid if the ſize of the objects had not been pretty nearly proportioned to their diſtance from the eye. We learn from Vitruvius, that Agatharchus, inſtructed by Æſchylus, was the firſt who wrote upon this ſubject; and that afterwards the principles of the art were more diſtinctly taught by Democritus and Anaxagoras, the diſciples of Agatharchus. Of the theory of this art, as deſcribed by them, we know nothing; ſince none of their writings have eſcaped the general wreck that was made of ancient literature in the dark ages of Europe. However, the revival of painting in Italy was accompanied with a revival of this art.

The firſt perſon who attempted to lay down the rules of perſpective was Pietro del Borgo, an Italian. He ſuppoſed objects to be placed beyond a tranſparent tablet, and endeavoured to trace the images which rays of light, emitted from them, would make upon it. But we do not know what ſucceſs he had in this attempt, becauſe the book which he wrote upon the ſubject is not now extant. It is, however, very much commended by the famous Egnazio Dante; and, upon the principles of Borgo, Albert Durer conſtructed a machine, by which he could trace the perſpective appearance of objects.

Balthazar Peruſſi ſtudied the writings of Borgo, and endeavoured to make them more intelligible. To him we owe the diſcovery of points of diſtance, to which all lines that make an angle of 45 degrees with the ground-line are drawn. A little time after, Guido Ubalni, another Italian, found that all the lines that are parallel to one another, if they be inclined to the ground-line, converge to ſome point in the horizontal line; and that through this point alſo, a line drawn from the eye, parallel to them, will paſs. Theſe principles put together enabled him to make out a pretty complete theory of perſpective.

Great improvements were made in the rules of perſpective by ſubſequent geometricians; particularly by Profeſſor Graveſende, and ſtill more by Dr Brooke Taylor, whoſe principles are in a great meaſure new, and far more general than any before him.

In order to underſtand the principles of perſpective, it will be proper to conſider the plane on which the repreſentation is to be made as tranſparent, and interpoſed between the eye of the ſpectator and the object to be repreſented. Thus, ſuppoſe a perſon at a window looks through an upright pane of glaſs at any object beyond it, and, keeping his head ſteady, draws the figure of the object upon the glaſs with a black lead pencil, as if the point of the pencil touched the object itſelf; he would then have a true repreſentation of the object in perſpective as it appears to his eye.

In order to this two things are neceſſary: firſt, that the glaſs be laid over with ſtrong gum-water, which, when dry, will be fit for drawing upon, and will retain the traces of the pencil: and, ſecondly, that he looks through a ſmall hole in a thin plate of metal, fixed about a foot from the glaſs, between it and his eye, and that he keeps his eye cloſe to the hole; otherwiſe he might ſhift the poſition of his head, and conſequently make a falſe delineation of the object.

Having traced out the figure of the object, he may go over it again with pen and ink; and when that is dry, put a ſheet of paper upon it, and trace it thereon with a pencil: then taking away the paper and laying it on a table, he may finiſh the picture by giving it the colours, lights, and ſhades, as he ſees them in the object itſelf; and then he will have a true reſemblance of the object.

To every perſon who has a general knowledge of the principles of optics, this muſt be ſelf-evident: For as viſion is occaſioned by pencils of rays coming in ſtraight lines to the eye from every point of the viſible object, it is plain that, by joining the points in the tranſparent plane, through which all thoſe pencils reſpectively paſs, an exact repreſentation muſt be formed of the object, as it appears to the eye in that particular poſition, and at that determined diſtance: and were pictures of things to be always firſt drawn on tranſparent planes, this ſimple operation, with the principle on which it is founded, would compriſe the whole theory and practice of perſpective. As this, however, is far from being the caſe, rules muſt be deduced from the ſciences of optics and geometry for drawing repreſentations of viſible objects on opaque planes; and the application of theſe rules conſtitutes what is properly called the *art* of perſpective.

Previous to our laying down the fundamental principles of this art, it may not be improper to obſerve, that when a perſon ſtands right againſt the middle of one end of a long avenue or walk, which is ſtraight and equally broad throughout, the ſides thereof ſeem to approach nearer and nearer to each other as they are further and further from his eye; or the angles, under which their different parts are ſeen, become leſs and leſs according as the diſtance from his eye increaſes; and if the avenue be very long, the ſides of it at the fartheſt end will ſeem to meet: and there an object that would cover the whole breadth of the avenue, and be of a height equal to that breadth, would appear only to be a mere point.

Having made theſe preliminary obſervations, we now proceed to the practice of perſpective, which is built upon the following

(*Fundamental*) THEOREM I.

Plate CCCCX. Fig. 1.

Let $abcd$ (fig. 1.) repreſent the ground-plan of the figure to be thrown into perſpective, and $efgh$ the tranſparent plane through which it is viewed by the eye at E. Let theſe planes interſect in the ſtraight line KL. Let B be any point in the ground-plan, and BE a ſtraight line, the path of a ray of light from that point to the eye. This will paſs through the plane $efgh$ in ſome point b; or B will be ſeen through that point, and b will be the picture, image, or repreſentation of B.

If BA be drawn in the ground-plan, making any angle BAK with the common interſection, and EV be drawn parallel to it, meeting the picture-plane or perſpective-plane in V, and VA be drawn, the point b is in the line VA ſo ſituated that BA is to EV as bA to bV.

For ſince EV and BA are parallel, the figure BA$b$VE$b$B is in one plane, cutting the perſpective-plane in the ſtraight line VA; the triangles BAb, EVb, are ſimilar, and $BA : EV = bA : bV$.

Cor. 1. If B be beyond the picture, its picture b is above the interſection KL; but if B be between the eye and the picture, as at B′, its picture b' is below KL.

2. If two other parallel lines BA′, ES, be drawn, and A′, S, be joined, the picture of B is in the interſection of the lines AV and A′S.

3. The line BA is repreſented by bA, or bA is the picture of BA; and if AB be infinitely extended, it will be repreſented by AV. V is therefore called the *vaniſhing point* of the line AB.

4. All lines parallel to AB are repreſented by lines converging to V from the points where theſe lines interſect the perſpective plane; and therefore V is the vaniſhing point of all ſuch parallel lines.

5. The pictures of all lines parallel to the perſpective plane are parallel to the lines themſelves. Fig. 2.

6. If through V be drawn HVO parallel to KL, the angle EVH is equal to BAK. Fig. 1.

Remark. The propoſition now demonſtrated is not limited to any inclination of the picture-plane to the ground-plane; but it is uſual to conſider them as perpendicular to each other, and the ground-plane as horizontal. Hence the line KL is called the *ground line*, and OH the *horizon line*; and OK, perpendicular to both, is called the *height of the eye*.

If ES be drawn perpendicular to the picture-plane, it will cut it in a point S of the horizon-line directly oppoſite to the eye. This is called the *point of ſight*, or *principal point*.

7. The pictures of all vertical lines are vertical, and the pictures of horizontal lines are horizontal, becauſe theſe lines are parallel to the perſpective plane.

8. The point of ſight S is the vaniſhing point of all lines perpendicular to the perſpective plane.

The above propoſition is a ſufficient foundation for the whole practice of perſpective, whether on direct or inclined pictures, and ſerves to ſuggeſt all the various practical conſtructions, each of which has advantages which ſuit particular purpoſes. Writers on the ſubject have either confined themſelves to one conſtruction, from an affectation of ſimplicity or fondneſs for ſyſtem; or have multiplied precepts, by giving every conſtruction for every example, in order to make a great book, and give the ſubject an appearance of importance and difficulty. An ingenious practitioner will avoid both extremes, and avail himſelf of the advantage of each conſtruction as it happens to ſuit his purpoſe. We ſhall now proceed to the practical rules, which require no conſideration of interſecting planes, and are all performed on the perſpective plane by means of certain ſubſtitutions for the place of the eye and the original figure. The general ſubſtitution is as follows:

Fig. 3. Let the plane of the paper be firſt ſuppoſed to be the ground-plan, and the ſpectator to ſtand at F (fig. 3.). Let it be propoſed that the ground-plan is to be repreſented on a plane ſurface, ſtanding perpendicularly on the line GKL of the plan, and that the point K is immediately oppoſite to the ſpectator, or that FK is perpendicular to GL: then FK is equal to the diſtance of the ſpectator's eye from the picture.

Now ſuppoſe a piece of paper laid on the plan with its ſtraight edge lying on the line GL; draw on this paper KS perpendicular to GL, and make it equal to the height of the eye above the ground-plan. This may be much greater than the height of a man, becauſe the ſpectator may be ſtanding on a place much raiſed above the ground-plan. Obſerve alſo that KS muſt be meaſured on the ſame ſcale on which the ground-plan and the diſtance FK were meaſured. Then draw HSO parallel to GL. This will be a horizontal line, and (when the picture is ſet upright on GL) will be on a level with the ſpectator's eye, and the point S will be directly oppoſite to his eye. It is therefore called the *principal point*, or *point of ſight*. The diſtance of his eye from this point will be equal to FK. Therefore make SP (in the line SK) equal to FK, and P is the projecting point or ſubſtitute for the place of the eye. It is ſometimes convenient to place P above S, ſometimes to one ſide of it on the horizontal line, and in various other ſituations; and writers, ignorant of, or inattentive to, the principles of the theory, have given it different denominations, ſuch as *point of diſtance*, *point of view*, &c. It is merely a ſubſtitute for the point E in fig. 1. and its moſt natural ſituation is below, as in this figure.

The art of perſpective is conveniently divided into Ichnography, which teaches how to make a perſpective draught of figures on a plane, commonly called the ground-plan; and Scenography, which teaches how to draw ſolid figures, or ſuch figures as are raiſed above this plan.

Fundamental Prob. I. *To put into perſpective any given point of the ground-plan.*

Firſt general conſtruction.

From B and P (fig. 3.) draw any two parallel lines BA, PV, cutting the ground-line and horizon-line in A and V, and draw BP, AV, cutting each other in b; b is the picture of B. Fig. 3.

For it is evident that BA, PV, of this figure are analogous to BA and EV of fig. 1. and that $BA : PV = bA : bV$.

If BA' be drawn perpendicular to GL, PV will fall on PS, and need not be drawn. $A'V$ will be $A'S$.—This is the moſt eaſy conſtruction, and nearly the ſame with Ferguſon's.

Second general conſtruction.

Draw two lines BA, BA'', and two lines PV, PD, parallel to them, and draw AV, $A''D$, cutting each other in b: b is the picture of B by Cor. 2.—This conſtruction is the foundation of all the rules of perſpective that are to be found in the books on this ſubject. They appear in a variety of forms, owing to the ignorance or inattention of the authors to the principles. The rule moſt generally adhered to is as follows:

Draw BA (fig. 4.) perpendicular to the ground-line, and AS to the point of ſight, and ſet off $A\beta$ equal to BA. Set off SD equal to the diſtance of the eye in the oppoſite direction from S that β is from A, where B and E of fig. 1. are on oppoſite ſides of the picture; otherwiſe ſet them the ſame way. D is called the point of diſtance. Draw βD, cutting AS in b. This is evidently equivalent to drawing BA' and PS perpendicular to the ground-line and horizon-line, and BA'' and PD (fig. 3.) making an angle of 45° with theſe lines, with the additional puzzle about the way of ſetting off $A'A''$ and SD, which is avoided in the conſtruction here given. Fig. 4. Fig. 5.

This uſual conſtruction, however, by a perpendicular and the point of diſtance, is extremely ſimple and convenient; and two points of diſtance, one on each ſide of S, ſerve for all points of the ground plan. But the firſt general conſtruction requires ſtill fewer lines, if BA be drawn perpendicular to GL, becauſe PV will then coincide with PS.

Third general conſtruction.

Draw BA (fig. 4.) from the given point B perpendicular to the ground-line, and AS to the point of ſight. From the point of diſtance D ſet off Dd equal to BA, on the ſame or the contrary ſide as S, according as B is on the ſame or the contrary ſide of the picture as the eye. Join d, A, and draw Db parallel to dA. b is the picture of B. For SD, Dd, are equal to the diſtances of the eye and given point from the picture, and $SD : Dd = bS : bA$. Fig. 4.

This conſtruction does not naturally ariſe from the original lines, but is a geometrical conſequence from their poſition and magnitude; and it is of all others the moſt generally convenient, as the perpendicular diſtances of any number of points may be arranged along SD without confuſion, and their direct ſituations transferred to the ground-line by perpendiculars ſuch as BA; and nothing [illegible] is eaſier than drawing parallels, either by a pa-[illegible] or a bevel-ſquare, uſed by all who practiſe [illegible]

Prob. 2. *To put any ſtraight line BC (fig. 5.) of the ground plan in perſpective.*

Find the pictures b, c, of its extreme points by any of the foregoing conſtructions, and join them by the ſtraight line $b\,c$.

Perhaps the following conſtruction will be found very generally convenient.

Produce CB till it meet the ground-line in A, and draw PV parallel to it; join AV, and draw PB, PC, cutting AV in b, c. V is its vaniſhing point, by Cor. 3. of the fundamental theorem.

It muſt be left to the experience and ſagacity of the drawer to ſelect ſuch circumſtances as are moſt ſuitable to the multiplicity of the figures to be drawn.

Prob. 3. *To put any rectilineal figure of the ground-plan in perſpective.*

Put the bounding lines in perſpective, and the problem is ſolved.

The variety of conſtructions of this problem is very great, and it would fill a volume to give them all. The moſt generally convenient is to find the vaniſhing points of the bounding lines, and connect theſe with the points of their interſection with the ground-line. Fig. 6. For example, to put the ſquare ABCD (fig. 6.) into perſpective.

Draw from the projecting point PV, PW, parallel to AB, BC, and let AB, BC, CD, DA, meet the ground-line, in α, $\varkappa$, δ, β, and draw αV, δV, $\varkappa$W, βW, cutting each other in $a\,b\,c\,d$, the picture of the ſquare ABCD. The demonſtration is evident.

This conſtruction, however, runs the figure to great diſtances on each ſide of the middle line, when any of the lines of the original figure are nearly parallel to the ground-line.

Fig. 7. The following conſtruction (fig. 7.) avoids this inconvenience.

Let D be the point of diſtance. Draw the perpendiculars Aα, Bβ, C$\varkappa$, Dδ, and the lines Ae, Bf, Cg, Dh, parallel to PD. Draw Sα, Sβ, S$\varkappa$, Sδ, and De, Df, Dg, Dh, cutting the former in a, b, c, d, the angles of the picture.

It is not neceſſary that D be the point of diſtance, only the lines Ae, Bf, &c. muſt be parallel to PD.

Remark. In all the foregoing conſtructions the neceſſary lines (and even the finiſhed picture) are frequently confounded with the original figure. To avoid this great inconvenience, the writers on perſpective direct us to tranſpoſe the figure; that is, to transfer it to the other ſide of the ground-line, by producing the perpendiculars Aα, Bβ, C$\varkappa$, Dδ, till αA′, βB′, &c. are reſpectively equal to Aα, Bβ, &c.; or, inſtead of the original figure, to uſe only its tranſpoſed ſubſtitute A′B′C′D′. This is an extremely proper method. But in this caſe the point P muſt alſo be tranſpoſed to P′ above S, in order to retain the firſt or moſt natural and ſimple con-
Fig 8. ſtruction, as in fig. 8.; where it is evident, that when BA=AB′, and SP=SP′, and B′P′ is drawn, cutting AS in b, we have bA : bS=B′A : P′S,=BA : PS, and b is the picture of B: whence follows the truth of all the ſubſequent conſtructions with the tranſpoſed figure.

Prob. 4. *To put any curvilineal figure on the ground-plan into perſpective.*

Put a ſufficient number of its points in perſpective by the foregoing rules, and draw a curve line through them.

It is well known that the conic ſections and ſome other curves, when viewed obliquely, are conic ſections or curves of the ſame kinds with the originals, with different poſitions and proportions of their principal lines, and rules may be given for deſcribing their pictures founded on this property. But theſe rules are very various, unconnected with the general theory of perſpective, and more tedious in the execution, without being more accurate than the general rule now given. It would be a uſeleſs affectation to inſert them in this elementary treatiſe.

We come in the next place to the delineation of figures not in a horizontal plane, and of ſolid figures. For this purpoſe it is neceſſary to demonſtrate the following

THEOREM II.

The length of any vertical line ſtanding on the ground plane is to that of its picture as the height of the eye to the diſtance of the horizon line from the picture of its foot.

Let BC (fig. 2.) be the vertical line ſtanding on B, Fig.
and let EF be a vertical line through the eye. Make BD equal to EF, and draw DE, CE, BE. It is evident that DE will cut the horizon line in ſome point d, CE will cut the picture plane in c, and BE will cut it in b, and that $b\,c$ will be the picture of BC, and is vertical, and that BC is to $b\,c$ as BD to $b\,d$, or as EF to $b\,d$.

Cor. The picture of a vertical line is divided in the ſame ratio as the line itſelf. For BC : BM= $b\,c : b\,m$.

Prob. 5. *To put a vertical line of a given length in perſpective ſtanding on a given point of the picture.*

Through the given point b (fig. 9.) of the picture, Fig
draw SbA from the point of ſight, and draw the vertical line AD, and make AE equal to the length or height of the given line. Join ES, and draw $b\,c$ parallel to AD, producing $b\,c$, when neceſſary, till it cut the horizontal line in d, and we have $b\,c : b\,d$,= AE : AD, that is, as the length of the given line to the height of the eye, and $b\,d$ is the diſtance of the horizon-line from the point b, which is the picture of the foot of the line. Therefore (Theor. 2.) $b\,c$ is the required picture of the vertical line.

This problem occurs frequently in views of architecture; and a compendious method of ſolving it would be peculiarly convenient. For this purpoſe, draw a vertical line XZ at the margin of the picture, or on a ſeparate paper, and through any point V of the horizon-line draw VX. Set off XY, the height of the vertical line, and draw VY. Then from any points b, r, on which it is required to have the pictures of lines equal to XY, draw $b\,s$, $r\,t$, parallel to the horizon-line, and draw the verticals *s u*, *t v*: theſe have the lengths required, which may be transferred to *b* and *r*. This, with the third general conſtruction for the baſe points, will ſave all the confuſion of lines which would ariſe from conſtructing each line apart.

Prob. 6. *To put any ſloping line in perſpective.*

From the extremities of this line, ſuppoſe perpendiculars meeting the ground plane in two points, which we ſhall call the baſe points of the ſloping line. Put theſe baſe points in perſpective, and draw, by laſt problem, the perpendiculars from the extremities. Join theſe by a ſtraight line. It will be the picture required.

Prob. 7. *To put a ſquare in perſpective, as ſeen by a perſon not ſtanding right againſt the middle of either of its ſides, but rather nearly even with one of its corners.*

Fig. 10. In fig. 10. let ABCD be a true ſquare, viewed by an obſerver, not ſtanding at *o*, directly againſt the middle of its ſides AD, but at O almoſt even with its corner D, and viewing the ſide AD under the angle AOD; the angle A *o* D (under which he would have ſeen AD from *o*) being 60 degrees.

Fig. 11. Make AD in fig. 11. equal to AD in fig. 10. and draw SP and O *o* parallel to AD. Then, in fig. 11. let O be the place of the obſerver's eye, and SO be perpendicular to SP; then S ſhall be the point of ſight in the horizon SP.

Take SO in your compaſſes, and ſet that extent from S to P; then P ſhall be the true point of diſtance, taken according to the foregoing rules.

From A and D draw the ſtraight lines AS and DS; draw alſo the ſtraight line AP, interſecting DS in C.

Laſtly, through the point of interſection C draw BC parallel to AD; and ABCD in fig. 11. will be a true perſpective repreſentation of the ſquare ABCD in fig. 10. The point M is the centre of each ſquare, and AMC and BMD are the diagonals.

Prob. 8. *To put a reticulated ſquare in perſpective, as ſeen by a perſon ſtanding oppoſite to the middle of one of its ſides.*

A reticulated ſquare is one that is divided into ſeveral little ſquares, like net-work, as fig. 12. each ſide of which is divided into four equal parts, and the whole ſurface into four times four (or 16) equal ſquares. Fig. 12.

Having divided this ſquare into the given number of leſſer ſquares, draw the two diagonals A *x* C and B *x* D.

Fig. 13. Make AD in fig. 13. equal to AD in fig. 12. and divide it into four equal parts, as A *e*, *e g*, *g i*, and *i* D.

Draw SP for the horizon, parallel to AD, and, through the middle point *g* of AD, draw OS perpendicular to AD and SP.—Make S the point of ſight, and O the place of the obſerver's eye.

Take SP equal to SO, and P ſhall be the true point of diſtance.—Draw AS and DS to the point of ſight, and AP to the point of diſtance, interſecting DS in C: then draw BC parallel to AD, and the outlines of the reticulated ſquare ABCD will be finiſhed.

From the diviſion points *e*, *g*, *i*, draw the ſtraight lines *e f*, *g h*, *i k*, tending towards the point of ſight S; and draw BD for one of the diagonals of the ſquare, the other diagonal AC being already drawn.

Through the points *r* and *s*, where theſe diagonals cut *e f* and *i k*, draw *l m* parallel to AD. Through the centre-point *x*, where the diagonals cut *g h*, draw *n o* parallel to AD.—Laſtly, through the points *v* and *w*, where the diagonals cut *e f* and *i k*, draw *p q* parallel to AD; and the reticulated perſpective ſquare will be finiſhed.

This ſquare is truly repreſented, as if ſeen by an obſerver ſtanding at O, and having his eye above the horizontal plane ABCD on which it is drawn; as if OS was the height of his eye above that plane: and the lines which form the ſmall ſquares within it have the ſame letters of reference with thoſe in fig. 12. which is drawn as it would appear to an eye placed perpendicularly above its centre *x*.

Prob. 9. *To put a circle in perſpective.*

If a circle be viewed by an eye placed directly over its centre, it appears perfectly round, but if it be obliquely viewed, it appears of an elliptical ſhape. This is plain by looking at a common wine-glaſs ſet upright on a table.

Make a true reticulated ſquare, as fig. 12. of the ſame Fig. 12. diameter as you would have the circle; and ſetting one foot of your compaſſes in the centre *x*, deſcribe as large a circle as the ſides of the ſquare will contain. Then, having put this reticulated ſquare into perſpective, as in fig. 13. obſerve through what points of the croſs lines and diagonals of fig. 12. the circle paſſes; and through the like points in fig. 13. draw the ellipſis, which will be as true a perſpective repreſentation of the circle, as the ſquare in fig. 13. is of the ſquare in fig. 12.

This is Mr Ferguſon's rule for putting a circle in perſpective; but the following rules by Wolf are perhaps more univerſal.

If the circle to be put in perſpective be ſmall, deſcribe a ſquare about it. Draw firſt the diagonals of the ſquare, and then the diameters *h a* and *d e* (fig. 14.) Fig. 14. cutting one another at right angles; draw the ſtraight lines *f g* and *b c* parallel to the diameter *d e*. Through *b* and *f*, and likewiſe *c* and *g*, draw ſtraight lines meeting DE, the ground line of the picture in the points 3 and 4. To the principal point V draw the ſtraight lines 1 V, 3 V, 4 V, 2 V, and to the points of diſtance L and K, 2 L and 1 K. Laſtly, join the points of interſection, *a*, *b*, *d*, *f*, *h*, *g*, *e*, *c*, by the arcs *a b*, *b d*, *d f*, and *a b d f h g e c a* will be the circle in perſpective.

If the circle be large ſo as to make the foregoing practice inconvenient, biſect the ground line AB, deſcribing, from the point of biſection as a centre, the ſemicircle AGB (fig. 15.), and from any number of Fig. 15. points in the circumference C, F, G, H, I, &c. draw to the ground line the perpendiculars C 1, F 2, G 3, H 4, I 5, &c. From the points A, 1, 2, 3, 4, 5, B, draw ſtraight lines to the principal point or point of ſight V, likewiſe ſtraight lines from B and A to the points of diſtance L and K. Through the common interſections draw ſtraight lines as in the preceding caſe; and you will have the points *a*, *c*, *f*, *g*, *h*, *i*, *b*, repreſentatives of A, C, F, G, H, I, B. Then join the points *a*, *c*, *f*, &c. as formerly directed, and you have the perſpective circle *a c f g h i b i l g f c a*.

Hence it is apparent how we may put not only a circle but alſo a pavement laid with ſtones of any form in perſpective. It is likewiſe apparent how uſeful the ſquare is in perſpective; for, as in the ſecond caſe, a true ſquare was deſcribed round the circle to be put in perſpective, and divided into ſeveral ſmaller ſquares, ſo in this third caſe we make uſe of the ſemicircle only for the ſake of brevity inſtead of that ſquare and circle.

Prob. 10. *To put a reticulated ſquare in perſpective, as ſeen by a perſon not ſtanding right againſt the middle of either of its ſides, but rather nearly even with one of its corners.* Fig. 16.

In fig. 16. let O be the place of an obſerver, viewing the ſquare ABCD almoſt even with its corner D.—Draw at pleaſure SP for the horizon, parallel to AD, and make SO perpendicular to SP: then S ſhall be the point of ſight, and P the true point of diſtance, if SP be made equal to SO.

Draw AS and DS to the point of ſight, and AP to the point of diſtance, interſecting DS in the point C; then draw BC parallel to AD, and the outlines of the perſpective ſquare will be finiſhed. This done, draw the lines which form the leſſer ſquares, as taught in Prob. 8. and the work will be completed.—You may put a perſpective circle in this ſquare by the ſame rule as it was done in fig. 13.

Prob. 14. *To put a cube in perſpective, as if viewed by a perſon ſtanding almoſt even with one of its edges, and ſeeing three of its ſides.* Fig 17.

In fig. 17. let AB be the breadth of either of the ſix equal ſquare ſides of the cube AG; O the place of the obſerver, almoſt even with the edge CD of the cube, S the point of ſight, SP the horizon parallel to AD, and P the point of diſtance taken as before.

Make ABCD a true ſquare; draw BS and CS to the point of ſight, and BP to the point of diſtance, interſecting CS in G.—Then draw FG parallel to BC, and the uppermoſt perſpective ſquare ſide BFGC of the cube will be finiſhed.

Draw DS to the point of ſight, and AP to the point of diſtance, interſecting DS in the point I: then draw GI parallel to CD; and, if the cube be an opaque one, as of wood or metal, all the outlines of it will be finiſhed; and then it may be ſhaded as in the figure.

But if you want a perſpective view of a tranſparent glaſs cube, all the ſides of which will be ſeen, draw AH toward the point of ſight, FH parallel to BA, and HI parallel to AD: then AHID will be the ſquare baſe of the cube, perſpectively parallel to the top BFGC; ABFH will be the ſquare ſide of the cube, parallel to CGID, and FGIH will be the ſquare ſide parallel to ABCD.

As to the ſhading part of the work, it is ſuch mere children's play, in compariſon of drawing the lines which form the ſhape of any object, that no rules need be given for it. Let a perſon ſit with his left ſide toward a window, and he knows full well, that if any ſolid body be placed on a table before him, the light will fall on the left-hand ſide of the body, and the right-hand ſide will be in the ſhade.

Prob. 15. *To put any ſolid in perſpective.*

Put the baſe of the ſolid, whatever it be, in perſpective by the preceding rules. From each bounding point of the baſe, raiſe lines repreſenting in perſpective the altitude of the object; by joining theſe lines and ſhading the figure according to the directions in the preceding problem, you will have a ſcenographic repreſentation of the object. This rule is general; but as its application to particular caſes may not be apparent, it will be proper to give the following example of it.

Prob. 16. *To put a cube in perſpective as ſeen from one of its angles.*

Since the baſe of a cube ſtanding on a geometrical plane, and ſeen from one of its angles, is a ſquare ſeen from one of its angles, draw firſt ſuch a perſpective ſquare: then raiſe from any point of the ground-line DE (fig. 18) the perpendicular HI equal to the ſide of the ſquare, and draw to any point V in the horizontal line HR the ſtraight lines VI and VH. From the angles d, b, and c, draw the dotted lines d 2 and c 1 parallel to the ground line DE. Perpendicular to thoſe dotted lines, and from the points 1 and 2, draw the ſtraight lines L 1 and M 2. Laſtly, ſince HI is the altitude of the intended cube in a, L 1 in c and b, M 2 in d, draw from the point a the ſtraight line fa perpendicular to a E, and from the points b and c, bg and ce, perpendicular to bc 1, and $abdc$ being according to rule, make $af =$ H I, $bg = ec =$ L 1, and $hd =$ M 2. Then, if the points g, h, e, f, be joined, the whole cube will be in perſpective. Fig. 18.

Prob. 17. *To put a ſquare pyramid in perſpective, as ſtanding upright on its baſe, and viewed obliquely.*

In fig. 19. let AD be the breadth of either of the four ſides of the pyramid ATCD at its baſe ABCD; and MT its perpendicular height. Let O be the place of the obſerver, S his point of ſight, SE his horizon, parallel to AD and perpendicular to OS; and let the proper point of diſtance be taken in SE produced toward the left hand, as far from S as O is from S. Fig. 19.

Draw AS and DS to the point of ſight, and DL to the point of diſtance, interſecting AS in the point B. Then, from B, draw BC parallel to AD; and ABCD ſhall be the perſpective ſquare baſe of the pyramid.

Draw the diagonal AC, interſecting the other diagonal BD at M, and this point of interſection ſhall be the centre of the ſquare baſe.

Draw MT perpendicular to AD, and of a length equal to the intended height of the pyramid: then draw the ſtraight outlines AT, CT, and DT; and the outlines of the pyramid (as viewed from O) will be finiſhed; which being done, the whole may be ſo ſhaded as to give it the appearance of a ſolid body.

If the obſerver had ſtood at o, he could have only ſeen the ſide ATD of the pyramid; and two is the greateſt number of ſides that he could ſee from any other place of the ground. But if he were at any height above the pyramid, and had his eye directly over its top, it would then appear as in fig. 20. and he would ſee all its four ſides E, F, G, H, with its top t just over the centre of its ſquare baſe ABCD; which Fig. 20.

would be a true geometrical and not a perſpective ſquare.

Prob. 18. *To put two equal ſquares in perſpective, one of which ſhall be directly over the other, at any given diſtance from it, and both of them parallel to the plane of the horizon.*

Fig. 21. In fig. 21. let ABCD be a perſpective ſquare on a horizontal plane, drawn according to the foregoing rules, S being the point of ſight, SP the horizon (parallel to AD), and P the point of diſtance.

Suppoſe AD, the breadth of this ſquare, to be three feet; and that it is required to place juſt ſuch another ſquare EFGH directly above it, parallel to it and two feet from it.

Make AE and DH perpendicular to AD, and two thirds of its length: draw EH, which will be equal and parallel to AD; then draw ES and HS to the point of ſight S, and EP to the point of diſtance P, interſecting HS in the point G: this done, draw FG parallel to EH; and you will have two perſpective ſquares ABCD and EFGH, equal and parallel to one another, the latter directly above the former, and two feet diſtant from it; as was required.

By this method ſhelves may be drawn parallel to one another, at any diſtance from each other in proportion to their length.

Prob. 19. *To put a truncated pyramid in perſpective.*

Let the pyramid to be put in perſpective be quinquangular. If from each angle of the ſurface whence the top is cut off, a perpendicular be ſuppoſed to fall upon the baſe, theſe perpendiculars will mark the bounding points of a pentagon, of which the ſides will be parallel to the ſides of the baſe of the pyramid, within which it is inſcribed. Join theſe points, and the interior pentagon will be formed with its longeſt ſide parallel to the longeſt ſide of the baſe of the pyramid. Fig. From the ground line EH (fig. 22.) raiſe the perpendicular IH, and make it equal to the altitude of the intended pyramid. To any point V draw the ſtraight lines IV and HV, and by a proceſs ſimilar to that in Prob. 16. determine the ſcenographical altitudes *a*, *b*, *c*, *d*, *e*. Connect the upper points *f*, *g*, *h*, *i*, *k*, by ſtraight lines; and draw *l k*, *f m*, *g n*, and the perſpective of the truncated pyramid will be completed.

Cor. If in a geometrical plane two concentric circles be deſcribed, a truncated cone may be put in perſpective in the ſame manner as a truncated pyramid.

Prob. 20. *To put in perſpective a hollow priſm lying on one of its ſides.*

Fig. 23. Let ABDEC (fig. 23.) be a ſection of ſuch a priſm. Draw HI parallel to AB, and diſtant from it the breadth of the ſide on which the priſm reſts; and from each angle internal and external of the priſm let fall perpendiculars to HI. The parallelogram will be thus divided by the ichnographical proceſs below the ground-line, ſo as that the ſide AB of the real priſm will be parallel to the correſponding ſide of the ſcenographic view of it.—To determine the altitude of the internal Fig. 24. and external angles. From H (fig. 24.) raiſe HI perpendicular to the ground-line, and on it mark off the true altitudes H 1, H 2, H 3, H 4, and H 5. Then if from any point V in the horizon be drawn the ſtraight lines VH, V 1, V 2, V 3, V 4, V 5 or VI; by a proceſs ſimilar to that of the preceding problem, will be determined the height of the internal angles, viz. $1=aa$, $2=bb$, $4=dd$; and of the external angles, $3=cc$, and $5=ee$; and when theſe angles are formed and put in their proper places, the ſcenograph of the priſm is complete.

Prob. 21. *To put a ſquare table in perſpective, ſtanding on four upright ſquare legs of any given length with reſpect to the breadth of the table.*

In fig. 21. let ABCD be the ſquare part of the floor Fig. 21. on which the table is to ſtand, and EFGH the ſurface of the ſquare table, parallel to the floor.

Suppoſe the table to be three feet in breadth, and its height from the floor to be two feet; then two thirds of AD or EH will be the length of the legs *i* and *k*; the other two (*l* and *m*) being of the ſame length in perſpective.

Having drawn the two equal and parallel ſquares ABCD and EFGH, as ſhown in Prob. 18. let the legs be ſquare in form, and fixed into the table at a diſtance from its edges equal to their thickneſs. Take A *a* and D *d* equal to the intended thickneſs of the legs, and *a b* and *d c* alſo equal thereto. Draw the diagonals AC and BD, and draw ſtraight lines from the points *a*, *b*, *c*, *d*, towards the point of ſight S, and terminating at the ſide BC. Then, through the points where theſe lines cut the diagonals, draw the ſtraight lines *n* and *o*, *p* and *q*, parallel to AD; and you will have formed four perſpective ſquares (like ABCD in fig. 19.) for Fig. 19. the baſes of the four legs of the table; and then it is eaſy to draw the four upright legs by parallel lines, all perpendicular to AD; and to ſhade them as in the figure.

To repreſent the intended thickneſs of the table-board, draw *e h* parallel to EH, and HG toward the point of ſight S: then ſhade the ſpaces between theſe lines, and the perſpective figure of the table will be finiſhed.

Prob. 22. *To put five ſquare pyramids in perſpective, ſtanding upright on a ſquare pavement compoſed of the ſurfaces of 81 cubes.*

In fig. 25. let ABCD be a perſpective ſquare drawn Fig. 25. according to the foregoing rules; S the point of ſight, P the point of diſtance in the horizon PS, and AC and BD the two diagonals of the ſquare.

Divide the ſide AD into 9 equal parts (becauſe 9 times 9 is 81) as A *a*, *a b*, *b c*, &c. and from theſe points of diviſion, *a*, *b*, *c*, *d*, &c. draw lines toward the point of ſight S, terminating at the furthermoſt ſide BC of the ſquare. Then, through the points where theſe lines cut the diagonals, draw ſtraight lines parallel to AD, and the perſpective ſquare ABCD will be ſubdivided into 81 leſſer ſquares, repreſenting the upper ſurfaces of 81 cubes, laid cloſe to one another's ſides in a ſquare form.

Draw AK and DL, each equal to A *a*, and perpendicular to AD; and draw LN toward the point of ſight S: then draw KL parallel to AD, and its diſtance from AD will be equal to A *a*.—This done, draw *a l*, *b m*, *c n*, *d o*, *e p*, *f q*, *g r*, and *h s*, all parallel to AK; and the ſpace ADLK will be ſubdivided into nine equal ſquares, which are the outer upright ſurfaces of the nine cubes in the ſide AD of the ſquare ABCD.

From the points where the lines, which are parallel to AD in this ſquare, meet the ſide CD thereof, draw ſhort lines to LN, all parallel to DL, and they will divide that ſide into the outer upright ſurfaces of the nine cubes which compoſe it: and then the outſides of all the cubes that can be viſible to an obſerver, placed at a proper diſtance from the corner D of the ſquare, will be finiſhed.

As taught in Prob. 17. place the pyramid AE upright on its ſquare baſe A *t v a*, making it as high as you pleaſe; and the pyramid DH on its ſquare baſe *h u w* D, of equal height with AE.

Draw EH from the top of one of theſe pyramids to the top of the other; and EH will be parallel to AD.

Draw ES and HS to the point of ſight S, and HP to the point of diſtance P, interſecting ES in F.

From the point F, draw FG parallel to EH; then draw EG, and you will have a perſpective ſquare EFGH (parallel to ABCD) with its two diagonals EG and FH, interſecting one another in the centre of the ſquare at I. The four corners of this ſquare, E, F, G, H, give the perſpective heights of the four pyramids AE, BF, CG, and DH; and the interſection I of the diagonals gives the height of the pyramid MI, the centre of whoſe baſe is the centre of the perſpective ſquare ABCD.

Laſtly, place the three pyramids BF, CG, MI, upright on their reſpective baſes at B, C, and M; and the required perſpective repreſentation will be finiſhed, as in the figure.

Prob. 23. *To put upright pyramids in perſpective, on the ſides of an oblong ſquare or parallelogram; ſo that their diſtances from one another ſhall be equal to the breadth of the parallelogram.*

Fig. 26. In moſt of the foregoing operations we have conſidered the obſerver to be ſo placed, as to have an oblique view of the perſpective objects: in this, we ſhall ſuppoſe him to have a direct view of fig. 26. that is, ſtanding right againſt the middle of the end AD which is neareſt to his eye, and viewing AD under an angle of 60 degrees.

Having cut AD in the middle, by the perpendicular line S *s*, take S therein at pleaſure for the point of ſight, and draw ES for the horizon, parallel to AD.—Here S *s* muſt be ſuppoſed to be produced downward, below the limits of the plate, to the place of the obſerver; and SE to be produced towards the left hand beyond E, far enough to take a proper point of diſtance therein, according to the foregoing rules.

Take A *d* at pleaſure, and D *g* equal to A *d*, for the breadths of the ſquare baſes of the two pyramids AE and DF next the eye: then draw AS and *d* S, and likewiſe DS and *g* S, to the point of ſight S; and DG on to the point of diſtance, interſecting AS in G: then, from G draw GI parallel to AD, you will have the firſt perſpective ſquare AGID of the parallelogram ABCD.

From I draw IH to (or toward) the point of diſtance, interſecting AS in H: then, from H draw HK parallel to AD, and you will have the ſecond perſpective ſquare GHKI of the parallelogram.—Go on in this manner till you have drawn as many perſpective ſquares up toward S as you pleaſe.

Through the point *e*, where DG interſects *g* S, draw *b f* parallel to AD; and you will have formed the two perſpective ſquare baſes A *b c d* and *e f* D *g* of the two pyramids at A and D.

From the point *f* (the upper outward corner of *e f* D *g*) draw *f h* toward the point of diſtance, till it meets AS in *h*; then, from this point of meeting, draw *l m* parallel to GI, and you will have formed the two perſpective ſquares G *h i k* and *l m* I *n*, for the ſquare baſes of the two pyramids at G and I.

Proceed in the ſame manner to find the baſes of all the other pyramids, at the corners of the reſt of the perſpective ſquares in the parallelogram ABCD, as ſhown by the figure.—Then,

Having placed the firſt two pyramids at A and D upright on their ſquare baſes, as ſhown in Prob. 9. and made them of any equal heights at pleaſure, draw ES and FS from the tops of theſe pyramids to the point of ſight S: place all the reſt of the pyramids upright on their reſpective baſes, making their tops touch the ſtraight lines ES and FS; and all the work, except the ſhading part, will be finiſhed.

Prob. 24. *To put a ſquare pyramid of equal ſized cubes in perſpective.*

Fig. 27. repreſents a pyramid of this kind; conſiſting as it were of ſquare tables of cubes, one table above another; 81 in the loweſt, 49 in the next, 25 in the third, 9 in the fourth, and 1 in the fifth or uppermoſt. Theſe are the ſquare numbers of 9, 7, 5, 3, and 1. Fig 27.

If the artiſt is already maſter of all the preceding operations, he will find leſs difficulty in this than in attending to the following deſcription of it: for it cannot be deſcribed in a few words, but may be executed in a very ſhort time.

In fig. 28. having drawn PS for the horizon, and taken S for the point of ſight therein (the obſerver being at O) draw AD parallel to PS for the ſide (next the eye) of the firſt or lowermoſt table of cubes. Draw AS and DS to the point of ſight S, and DP to the point of diſtance P, interſecting AS in the point B. Then, from B, draw BC parallel to AD, and you will have the ſurface ABCD of the firſt table. Fig. 28.

Divide AD into nine equal parts, as A *a*, *a b*, *b c*, *c d*, &c. then make AK and DL equal to A *a*, and perpendicular to AD. Draw KL parallel to AD, and from the points of equal diviſion at *a*, *b*, *c*, &c. draw lines to KL, all parallel to AK. Then draw *l* S to the point of ſight S, and from the diviſion points *a*, *b*, *c*, &c. draw lines with a black lead pencil, all tending towards the point of ſight, till they meet the diagonal BD of the ſquare.

From theſe points of meeting draw black lead lines to DC, all parallel to AD; then draw the parts of theſe lines with black ink which are marked 1, 2, 3, 4, &c. between *h* E and DC.

Having drawn the firſt of theſe lines *β q* with black ink, draw the parts *a i*, *b k*, *c l*, &c. (of the former lines which met the diagonal BD) with black ink alſo; and rub out the reſt of the black lead lines, which [illegible] the following part of the work. [illegible] toward the point of sight S; and from [illegible] where the lines 1, 2, 3, 4, &c. meet the line [illegible] LF, all parallel to ML; and [illegible] lines between the cubes in the first table [illegible].

[illegible] equal and perpendicular to [illegible] and [illegible] equal and parallel to [illegible]; then draw GM, which will be equal and parallel to [illegible]. From the points *i*, *l*, *m*, *n*, &c. draw [illegible], all parallel to [illegible] G, and the outlines of the [illegible] cubes in the side G *q* of the second table will be finished.

Draw GS and MS to the point of ſight S, and MP to the point of diſtance P, interſecting GS in H; then, from the point of interſection H, draw HI parallel to HD; and you will have the ſurface GHIM of the ſecond table of cubes.

From the points *n*, *o*, *p*, *q*, &c. draw black lead lines toward the point of ſight S, till they meet the diagonal MH of the perſpective ſquare ſurface GHIM; and draw SM with black ink, toward the point of ſight.

From thoſe points where the lines drawn from *n*, *o*, *p*, *q*, &c. meet the diagonal MH, draw black lead lines to MI, all parallel to [illegible]; only draw the whole firſt line *q* 1 with black ink, and the parts 2, 3, 4, &c. and *n t*, *o u*, *p v*, &c. of the other lines between *q* N and MI, and GM and *q* 1, with the ſame; and rub out all the reſt of the black lead lines, to avoid further confuſion. Then, from the points where the ſhort lines 1, 2, 3, &c. meet the line MI, draw lines down to *q* E, all parallel to M*q*, and the outer ſurfaces of the ſeven cubes in the ſide ME will be finiſhed; and all theſe laſt lines will meet the former parallels 2, 3, 4, &c. in the line *q* E.

Make *t* O equal and perpendicular to *y t*, and *y* P equal and parallel to *t* O; then draw OP, which will be equal and parallel to *t y*.—This done, draw OS and PS to the point of ſight S, and PP to the point of diſtance P in the horizon. Laſtly, from the point Q, where PP interſects OS, draw QR parallel to OP; and you will have the outlines OQRP of the ſurface of the third perſpective table of cubes.

From the points *u*, *v*, *w*, *x*, draw upright lines to OP, all parallel to *t* O, and you will have the outer ſurfaces of the five cubes in the ſide O *y* of this third table.

From the points where theſe upright lines meet OP, draw lines toward the point of ſight S, till they meet the diagonal PQ; and from theſe points of meeting draw lines to PR, all parallel to OP, making the parts 2, 3, 4, 5, of theſe lines with black ink which lie between ZY and PR. Then, from the points where theſe lines meet PR, draw lines down to *y* N; which will bound the outer ſurfaces of the five cubes in the ſide PN of the third table.

Draw the line ∂ 1 with black ink; and, at a fourth part of its length between ∂ and Z, draw an upright line to S, equal in length to that fourth part, and another equal and parallel thereto from Z to V: then draw SV parallel to ∂ Z, and draw the two upright and equidiſtant lines between ∂ Z and SV, and you will have the outer ſurfaces of the three cubes in the ſide SZ of the fourth table.

Draw SS and VS to the point of ſight S in the horizon, and VP to the point of diſtance therein, interſecting SS in T; then draw TU parallel to SV, and you have STUV, the ſurface of the fourth table, which being reticulated or divided into 9 perſpective ſmall ſquares, and the uppermoſt cube W placed on the middlemoſt of theſe ſquares, all the outlines will be finiſhed; and when the whole is properly ſhaded, as in fig. 27. the work will be done.

Prob. 25. *To repreſent a double croſs in perſpective.*

In fig. 29. let ABCD and EFGH be the two perſpective ſquares, equal and parallel to one another, the uppermoſt directly above the lowermoſt, drawn by the rules already laid down, and as far aſunder as is equal to the given height of the upright part of the croſs; S being the point of ſight, and P the point of diſtance, in the horizon PS taken parallel to AD. Fig. 29.

Draw AE, DH, and CG; then AEHD and DHGC ſhall be the two viſible ſides of the upright part of the croſs; of which, the length AE is here made equal to three times the breadth EH.

Divide DH into three equal parts, HI, IK, and KD. Through theſe points of diviſion, at I and K, draw MO and PR parallel to AD: and make the parts MI, IO, PK, KR, each equal to HI: then draw MP and OR parallel to DH.

From M and O, draw MS and OS to the point of ſight S; and from the point of diſtance P draw PN cutting MS in T: from T draw TU parallel to MO, and meeting OS in U; and you will have the uppermoſt ſurface MTUO of one of the croſs pieces of the figure. ——From R, draw RS to the point of ſight S; and from U draw UV parallel to OR; and OUVR ſhall be the perſpective ſquare end next the eye of that croſs part.

Draw PMX (as long as you pleaſe) from the point of diſtance P, through the corner M; lay a ruler to N and S, and draw XN from the line PX:—then lay the ruler to I and S, and draw YZS.—Draw XY parallel to MO, and make XW and YB equal and perpendicular to XY: then draw WB parallel to XY, and WXYB ſhall be the ſquare viſible end of the other croſs part of the figure.

Draw BK toward the point of ſight S; and from U draw UP to the point of diſtance P, interſecting YS in Z: then, from the interſection Z, draw Z *a* parallel to MO, and Z *b* parallel to HD, and the whole delineation will be finiſhed.

This done, ſhade the whole, as in fig. 30. and you will have a true perſpective repreſentation of a double croſs. Fig. 30.

Prob. 26. *To put three rows of upright ſquare objects in perſpective, equal in ſize, and at equal diſtances from each other, on an oblong ſquare plane, the breadth of which ſhall be of any aſſigned proportion to the length thereof.*

Fig. 31. is a perſpective repreſentation of an oblong ſquare plane, three times as long as it is broad, having a row of nine upright ſquare objects on each ſide, and one of the ſame number in the middle; all equally high, and at equal diſtances from one another, both long-wiſe and croſs-wiſe, on the ſame plane. Fig. 31.

In fig. 32. PS is the horizon, S the point of ſight, P the Fig. 32.

the point of ſight, and AD (parallel to PS) the breadth of the plane.

Draw AS, NS, and DS, to the point of ſight S; the point N being in the middle of the line AD: and draw DP to the point of diſtance P, interſecting AS in the point B: then, from B draw BC parallel to AD, and you have the perſpective ſquare ABCD.

Through the point *e*, where DB interſects NS, draw *a e b* parallel to AD: and you will have ſubdivided the perſpective ſquare ABCD into four leſſer ſquares, as A *a e* N, N *e b* D, *a* B *k e*, and *e k* C *b*.

From the point C (at the top of the perſpective ſquare ABCD) draw CP to the point of diſtance P, interſecting AS in E; then, from the point E draw EF parallel to AD: and you will have the ſecond perſpective ſquare BEFC.

Through the point *l*, where CE interſects NS, draw *k l f* parallel to AD; and you will have ſubdivided the ſquare BEFC into the four ſquares B *i l k*, *k l f* C, *i* E *m l*, and *l m* F *f*.

From the point F (at the top of the perſpective ſquare BEFC) draw FP to the point of diſtance P, interſecting AS in I; then from the point I draw IK parallel to AD; and you will have the third perſpective ſquare EIKF.

Through the point *n*, where FI interſects NS, draw *c g* parallel to AD; and you will have ſubdivided the ſquare EIKF into four leſſer ſquares, E *c n m*, *m n g* F, *c* I *o n*, and *n o* K *g*.

From the point K (at the top of the third perſpective ſquare EIKF) draw KP to the point of diſtance P, interſecting AS in L: then from the point L draw LM parallel to AD; and you will have the fourth perſpective ſquare ILMK.

Through the point *p*, where KL interſects NS, draw *d h* parallel to AD; and you will have ſubdivided the ſquare ILMK into the four leſſer ſquares I *d p o*, *o p h* K, *d* L *q p*, and *p q* M *h*.

Thus we have formed an oblong ſquare ALMD, whoſe perſpective length is equal to four times its breadth, and it contains 16 equal perſpective ſquares.—If greater length was ſtill wanted, we might proceed further on toward S.

Take A 3, equal to the intended breadth of the ſide of the upright ſquare object AQ (all the other ſides being of the ſame breadth), and AO for the intended height. Draw O 18 parallel to AD, and make D 8 and 4 7 equal to A 3: then draw 3 S, 4 S, 7 S, and 8 S to the point of ſight S; and among them we ſhall have the perſpective ſquare baſes of all the 27 upright objects on the plane.

Through the point 9, where DB interſects 8 S, draw 1 10 parallel to AD, and you have the three perſpective ſquare baſes A 1 2 3, 4 5 6 7, 8 9 10 D, of the three upright ſquare objects at A, N, and D.

Through the point 21, where *e b* interſects 8 S, draw 14, 11 parallel to AD; and you will have the three perſpective ſquares *a* 14 15 16, 17 18 19 20, and 21 11 *e* 22, for the baſes of the ſecond croſs row of objects; namely, the next beyond the firſt three at A, N, and D.

Through the point *w*, where CE interſects 8 S, draw a line parallel to BC; and you will have three perſpective ſquares, at B, *k*, and C, for the baſes of the third row of objects; one of which is ſet up at B.

Through the point *x*, where *y* [illegible] interſects [illegible], draw a line parallel to *k f*, and you will have three perſpective ſquares, at *i*, *l*, and *f*, for the baſes of the fourth croſs row of objects.

Go on in this manner, as you ſee in the figure, to find the reſt of the ſquare baſes, up to LM; and you will have 27 upon the whole oblong ſquare plane, on which you are to place the ſame number of objects, as in fig. 31.

Having aſſumed AO for the perſpective height of the three objects at A, N, and D (fig. 32.) next the obſerver's eye, and drawn O 18 parallel to AD, in order to make the objects at N and D of the ſame height as that at O; and having drawn the upright lines 4 15, 7 W, 8 X, and D 22, for the heights at N and D; draw OS and RS, 15 S and WS, XS and 22 S, all to the point of ſight S: and theſe lines will determine the perſpectively equal heights of all the reſt of the upright objects, as ſhown by the two placed at *e* and B.

To draw the ſquare tops of theſe objects, equal and parallel to their baſes, we need only give one example, which will ſerve for all.

Draw 3 R and 2 Q parallel to AO, and up to the line RS; then draw PQ parallel to OR, and OPQR ſhall be the top of the object at A, equal and parallel to its ſquare baſe A 1 2 3.—In the ſame eaſy way the tops of all the other objects are formed.

When all the reſt of the objects are delineated, ſhade them properly, and the whole perſpective ſcheme will have the appearance of fig. 31.

PROB. 27. *To put a ſquare box in perſpective, containing a given number of leſſer ſquare boxes of a depth equal to their width.*

Let the given number of little ſquare boxes or cells be 16, then 4 of them make the length of each ſide of the four outer ſides *a b*, *b c*, *cd*, *d a*, as in fig. 33. and the depth *a f* is equal to the width *a e*. Whoever can draw the reticulated ſquare, by the rules laid down towards the beginning of this article, will be at no loſs about putting this perſpective ſcheme in practice. Fig.

PROB. 28. *To put ſtairs with equal and parallel ſteps in perſpective.*

In fig. 34. let *a b* be the given breadth of each ſtep, and *a i* the height thereof. Make *b c*, *c d*, *d e*, &c. each equal to *a b*; and draw all the upright lines *a i*, *b l*, *c n*, *d p*, &c. perpendicular to *a b* (to which the horizon PS is parallel); and from the points *i*, *l*, *n*, *p*, *r*, &c. draw the equidiſtant lines *i* B, *l* C, *n* D, &c. parallel to *a b*; theſe diſtances being equal to that of *i* B from *a b*. Fig.

Draw *x i* touching all the corner-points *l*, *n*, *p*, *r*, *t*, *v*; and draw 2 16 parallel to *x i*, as far from it as you want the length of the ſteps to be.

Toward the point of ſight S draw the lines *a* 1, *i* 2, *k* 3, *l* 4, &c. and draw 16 15, 14 13, 12 11, 10 9, 8 7, 6 5, 4 3, and 2 1, all parallel to A *l*, and meeting the lines *w* 15, *u* 13, *s* 11, &c. in the points 15, 13, 11, 9, 7, 5, 3, and 1: then from theſe points draw 15 14, 13 12, 11 10, 9 8, 7 6, 5 4, and 3 2, all parallel to *h a*; and the outlines of the ſteps will be finiſhed. From the point 16 draw 16 A parallel to *l a*, and A 16 will be part of the flat at the top of the uppermoſt ſtep.

Fig. 35. This done, ſhade the work as in fig. 35. and the whole will be finiſhed.

PROB. 29. *To put ſtairs with flats and opening in perſpective, ſtanding on a horizontal pavement of ſquares.*

Fig. 36. In fig. 36. having made S the point of ſight, and drawn a reticulated pavement AB with black lead lines, which may be rubbed out again; at any diſtance from the ſide AB of the pavement which is neareſt to the eye, and at any point where you chooſe to begin the ſtair at that diſtance, as *a*, draw G *a* parallel to BA, and take *a b* at pleaſure for the height of each ſtep.

Take *a b* in your compaſſes, and ſet that extent as many times upward from F to E as is equal to the firſt required number of ſteps O, N, M, L, K; and from theſe points of diviſion in EF draw 1 *b*, 2 *d*, 3 *f*, 4 *h*, and E *k*, all equidiſtant from one another, and parallel to F *a*: then draw the equidiſtant upright lines *a b*, *t d*, *u f*, *v h*, *w k*, and I *m*, all perpendicular to F *a*: then draw *m b*, touching the outer corners of theſe ſteps at *m*, *k*, *h*, *f*, *d*, and *b*; and draw *n s* parallel to *m b*, as far from it as you want the length of the ſteps K, L, M, N, O to be.

Towards the point of ſight S drawn *m n*, *l* 5, *k o*, *i* 6, *h p*, *f q*, *d r*, and *b s*. Then (parallel to the bottom-line BA) through the points *n*, *o*, *p*, *q*, *r*, *s*, draw *n* 8; 5, 14; 6, 15; 7, 16; 1, 17; and 2 *s*: which done, draw *n* 5 and *o* 6 parallel to *l m*, and the outlines of the ſteps K, L, M, N, O will be finiſhed.

At equal diſtances with that between the lines marked 8 and 14, draw the parallel lines above marked 9 10 11 12 and 13; and draw perpendicular lines upwards from the points *n*, *o*, *p*, *q*, *r*, *s*, as in the figure.

Make H *m* equal to the intended breadth of the flat above the ſquare opening at the left hand, and draw HW toward the point of ſight S, equal to the intended length of the flat; then draw WP parallel to H *m*, and the outlines of the flat will be finiſhed.

Take the width of the opening at pleaſure, as from F to C, and draw CD equal and parallel to FE. Draw GH parallel to CD, and the ſhort lines marked 33, 34, &c. juſt even with the parallel lines 1, 2, &c. From the points where theſe ſhort lines meet CD draw lines toward the point of ſight S till they meet DE; then from the points where the lines 38, 39, 40, &c. of the pavement meet C *y*, draw upright lines parallel to CD; and the lines which form the opening will be finiſhed.

The ſteps P, Q, R, S, T, and the flat U above the arch V, are done in the ſame manner with thoſe in fig. 34. as taught in Prob. 28. and the equidiſtant parallel lines marked 18, 19, &c. are directly even with thoſe on the left-hand ſide of the arch V, and the upright lines on the right-hand ſide are equidiſtant with thoſe on the left.

From the points where the lines 18, 19, 20, &c. meet the right-hand ſide of the arch, draw lines toward the point of ſight S; and from the points where the pavement lines 29, 30, 31, 32, meet the line drawn from A towards the point of ſight, draw upright lines toward the top of the arch.

Having done the top of the arch, as in the figure, and the few ſteps to the right hand thereof, ſhade the whole as in fig. 37. and the work will be finiſhed. Fig. 37.

PROB. 30. *To put upright conical objects in perſpective, as if ſtanding on the ſides of an oblong ſquare, at diſtances from one another equal to the breadth of the oblong.*

Fig. 38. In fig. 38. the baſes of the upright cones are perſpective circles inſcribed in ſquares of the ſame diameter; and the cones are ſet upright on their baſes by the ſame rules as are given for pyramids, which we need not repeat here.

In moſt of the foregoing operations we have conſidered the obſerver's eye to be above the level of the tops of all the objects, as if he viewed them when ſtanding on high ground. In this figure, and in fig. 41. and fig. 42. we ſhall ſuppoſe him to be ſtanding on low ground, and the tops of the objects to be above the level of his eye.

Fig. 38. In fig. 38. let AD be the perſpective breadth of the oblong ſquare ABCD; and let A *a* and D *d* (equal to A *a*) be taken for the diameters of the circular baſes of the two cones next the eye, whoſe intended equal heights ſhall be AE and DF.

Having made S the point of ſight in the horizon parallel to AD, and found the proper point of diſtance therein, draw AS and *a* S to contain the baſes of the cones on the left-hand ſide, and DS and *d* S for thoſe on the right.

Having made the two firſt cones at A and D of equal height at pleaſure, draw ES and FS from their tops to the point of ſight, for limiting the perſpective heights of all the reſt of the cones. Then divide the parallelogram ABCD into as many equal perſpective ſquares as you pleaſe; find the baſes of the cones at the corners of theſe ſquares, and make the cones thereon, as in the figure.

If you would repreſent a ceiling equal and parallel to ABCD, ſupported on the tops of theſe cones, draw EF, then EFGH ſhall be the ceiling; and by drawing *e f* parallel to EF, you will have the thickneſs of the floor-boards and beams, which may be what you pleaſe.

This ſhows how any number of equidiſtant pillars may be drawn of equal heights to ſupport the ceiling of a long room, and how the walls of ſuch a room may be repreſented in perſpective at the backs of theſe pillars. It alſo ſhows how a ſtreet of houſes may be drawn in perſpective.

PROB. 31. *To put a ſquare hollow in perſpective, the depth of which ſhall bear any aſſigned proportion to its width.*

Fig. 41. Fig. 41. is the repreſentation of a ſquare hollow, of which the depth AG is equal to three times its width AD; and S is the point of ſight over which the obſerver's eye is ſuppoſed to be placed, looking perpendicularly down into it, but not directly over the middle.

Draw AS and DS to the point of ſight S; make ST the horizon parallel to AD, and produce it to ſuch a length beyond T that you may find a point of diſtance therein not nearer S than if AD was ſeen under an angle of 60 degrees.

Draw DU to the point of diſtance, interſecting AS in B; then from the point B draw BC parallel to AD;

and you will have the firſt perſpective ſquare ABCD, equal to a third part of the intended depth.

Draw CV to the point of diſtance, interſecting AS in E; then from the point E draw EF parallel to AD; and you will have the ſecond perſpective ſquare BEFC, which, added to the former one, makes two-thirds of the intended depth.

Draw FW to the point of diſtance, interſecting AS in G; then from the point G draw GH parallel to AD; and you will have the third perſpective ſquare EGHF, which, with the former two, makes the whole depth AGHD three times as great as the width AD, in a perſpective view.

Divide AD into any number of equal parts, as ſuppoſe 8; and from the diviſion-points *a*, *b*, *c*, *d*, &c. draw lines toward the point of ſight S, and ending at GH; then through the points where the diagonals BD, EC, GF, cut theſe lines, draw lines parallel to AD; and you will have the parallelogram AGHD reticulated, or divided into 192 ſmall and equal perſpective ſquares.

Make AI and DM equal and perpendicular to AD; then draw IM, which will be equal and parallel to AD; and draw IS and MS to the point of ſight S.

Divide AI, IM, and MD, into the ſame number of equal parts as AD is divided; and from theſe points of diviſion draw lines toward the point of ſight S, ending reſpectively at GK, KL, and LH.

From thoſe points where the lines parallel to AD meet AG and DH draw upright lines parallel to AI and DM; and from the points where theſe lines meet IK and LM draw lines parallel to IM; then ſhade the work, as in the figure.

Prob. 32. *To repreſent a ſemicircular arch in perſpective, as if it were ſtanding on two upright walls, equal in height to the height of the obſerver's eye.*

Fig. 42. After having gone through the preceding operation, this will be more eaſy by a bare view of fig. 42. than it could be made by any deſcription; the method being ſo much like that of drawing and ſhading the ſquare hollow.—We need only mention, that *a* T *b* EA and DF*ctd* are the upright walls on which the ſemicircular arch is built; that S is the point of ſight in the horizon T*t*, taken in the centre of the arch; and *d* in fig. 41. is the point of diſtance; and that the two perſpective ſquares ABCD and BEFC make the parallelogram AEFD of a length equal to twice its breadth AD.

Prob. 33. *To repreſent a ſquare in perſpective, as viewed by an obſerver ſtanding directly even with one of its corners.*

Fig. 43. In fig. 43. let A 9 BC be a true ſquare, viewed by an obſerver ſtanding at ſome diſtance from the corner C, and juſt even with the diagonal C 9.

Let *p*SP be the horizon, parallel to the diagonal AB; and S the point of ſight, even with the diagonal C 9. Here it will be proper to have two points of diſtance *p* and P, equidiſtant from the point of ſight S.

Draw the ſtraight line 1 17 parallel to AB, and draw A 8 and B 10 parallel to CS. Take the diſtance between 8 and 9 in your compaſſes, and ſet it off all the way in equal parts from 8 to 1, and from 10 to 17.—The line 1 17 ſhould be produced a good way farther both to right and left hand from 9, and divided all the way in the ſame manner.

From theſe points of equal diviſion, 8, 9, 10, &c. draw lines to the point of ſight S, and alſo to the two points of diſtance *p* and P, as in the figure.

Now it is plain, that *a c l* 9 is the perſpective repreſentation of A 9 BC, viewed by an obſerver even with the corner C and diagonal C 9.—But if there are other ſuch ſquares lying even with this, and having the ſame poſition with reſpect to the line 1 17, it is evident that the obſerver, who ſtands directly even with the corner C of the firſt ſquare, will not be even with the like corners G and K of the others; but will have an oblique view of them, over the ſides FG and IK, which are neareſt his eye: and their perſpective repreſentations will be *e g f* 6 and *h k i* 3, drawn among the lines in the figure: of which the ſpaces taken up by each ſide lie between three of the lines drawn toward the point of diſtance *p*, and three drawn to the other point of diſtance P.

Prob. 34. *To repreſent a common chair, in an oblique perſpective view.*

The original lines to the point of ſight S, and points of diſtance *p* and P, being drawn as in the preceding operation, chooſe any part of the plane, as *l m n* 13, on which you would have the chair L to ſtand.—There are juſt as many lines (namely two) between *l* and *m* or 13 and *n*, drawn toward the point of diſtance *p*, at the left hand, as between *l* and 13, or *m* and *n*, drawn to the point of diſtance P on the right: ſo that *l m*, *m n*, *n* 13, and 13 *l*, form a perſpective ſquare. Fig. 43.

From the four corners *l*, *m*, *n*, 13, of this ſquare raiſe the four legs of the chair to the perſpective perpendicular height you would have them: then make the ſeat of the chair a ſquare equal and parallel to *l m n* 13, as taught in Prob. 18. which will make the two ſides of the ſeat in the direction of the lines drawn toward the point of diſtance *p*, and the fore and back part of the ſeat in direction of the lines drawn to the other point of diſtance P. This done, draw the back of the chair leaning a little backward, and the croſs bars therein tending toward the point of diſtance P. Then ſhade the work as in the figure; and the perſpective chair will be finiſhed.

Prob. 35. *To preſent an oblong ſquare table in an oblique perſpective view.*

In fig. 43. M is an oblong ſquare table, as ſeen by an obſerver ſtanding directly even with C 9 (ſee Prob. 33.), the ſide next the eye being perſpectively parallel to the ſide *a c* of the ſquare *a l c* 9.—The forementioned lines drawn from the line 1 17 to the two points of diſtance *p* and P, form equal perſpective ſquares on the ground plane.

Chooſe any part of this plane of ſquares for the feet of the table to ſtand upon; as at *p*, *q*, *r*, and *s*, in direction of the lines *o p* and *r s* for the two long ſides, and *t s* and *q r* for the two ends; and you will have the oblong ſquare or parallelogram *q r s t* for the part of the floor or ground-plane whereon the table is to ſtand: and the breadth of this plane is here taken in proportion to the length as 6 to 10; ſo that, if the length of the table be ten feet, its breadth will be ſix.

On the four little perſpective ſquares at *q*, *r*, *s*, and place the four upright legs of the table, of what height you pleaſe, ſo that the height of the two next the eye, at *o* and *p*, ſhall be terminated by a ſtraight line *n t* drawn to the point of diſtance P. This done, make the leaf M of the table an oblong ſquare, perſpectively equal and parallel to the oblong ſquare *q r s t* on which the feet of the table ſtands. Then ſhade the whole, as in the figure, and the work will be finiſhed.

If the line 1 17 were prolonged to the right and left hand, and equally divided throughout (as it is from 1 to 17), and if the lines which are drawn from *p* and P to the right and left hand ſides of the plate were prolonged till they came to the extended line 1 17, they would meet it in the equal points of diviſion. In forming large plans of this ſort, the ends of ſlips of paper may be paſted to the right and left edges of the ſheet on which the plan is to be formed.

Of the Anamorphoſis, or reformation of diſtorted images.

By this means pictures that are ſo miſhapen, as to exhibit no regular appearance of any thing to the naked eye, ſhall, when viewed by reflection, preſent a regular and beautiful image. The inventor of this ingenious device is not known. Simon Stevinus, who was the firſt that wrote upon it, does not inform us from whom he learned it. The principles of it are laid down by S. Vauzelard in his *Perſpective Conique et Cylindrique*; and Gaſper Schott profeſſes to copy Marius Bettinus in his deſcription of this piece of artificial magic.

It will be ſufficient for our purpoſe to copy one of the ſimpleſt figures of this writer, as by this means the myſtery of this art will be ſufficiently unfolded. Upon the cylinder of paper, or paſteboard, ABCD, fig. 44. draw whatever is intended to be exhibited, as the letters IHS. Then with a needle make perforations along the whole outline; and placing a candle, G, behind this cylinder, mark upon the ground plane the ſhadow of them, which will be diſtorted more or leſs, according to the poſition of the candle or the plane, &c. This being done, let the picture be an exact copy of this diſtorted image, let a metallic ſpeculum be ſubſtituted in the place of the cylinder, and let the eye of the ſpectator have the ſame poſition before the cylinder that the candle had behind it. Then looking upon the ſpeculum, he will ſee the diſtorted image reſtored to its proper ſhape. The reformation of the image, he ſays, will not eaſily be made exact in this method, but it will be ſufficiently ſo to anſwer the purpoſe. Fig. 44.

Other methods, more exact and geometrical than this, were found out afterwards: ſo that theſe pictures could be drawn by certain rules, without the uſe of a candle. Schott quotes one of theſe methods from Bettinus, another from Herigonius, and another from Kircher, which may be ſeen in his *Magia*, vol. i. p. 162, &c. He alſo gives an account of the methods of reforming pictures by ſpeculums of conical and other figures.

Inſtead of copying any of theſe methods from Schott or Bettinus, we ſhall preſent our readers with that which Dr Smith hath given us in his Optics, vol. i. p. [illegible], as, no doubt, the beſt, and from which any perſon may eaſily make a drawing of this kind. The ſame deſcription anſwers to two mirrors, one of which, fig. 39. is convex, and the other, fig. 40. is concave. Fig. 39. and 40.

In order to paint upon a plane a deformed copy ABCDEKIHGF of an original picture, which ſhall appear regular, when ſeen from a given point O, elevated above the plane, by rays reflected from a poliſhed cylinder, placed upon the circle *l n p*, equal to its given baſe; from the point R, which muſt be ſuppoſed to lie perpendicularly under O, the place of the eye, draw two lines R *a*, R *e*; which ſhall either touch the baſe of the cylinder, or elſe cut off two ſmall equal ſegments from the ſides of it, according as the copy is intended to be more or leſs deformed. Then, taking the eye, raiſed above R, to the given height RO, ſomewhat greater than that of the cylinder, for a luminous point, deſcribe the ſhadow *a e k f* (of a ſquare, fig. 39. or parallelogram ſtanding upright upon *a e* as a baſe, and containing the picture required) anywhere behind the arch *l n p*. Let the lines drawn from R to the extremities and diviſions of the baſe *a*, *b*, *c*, *d*, *e*, cut the remoteſt part of the ſhadow in the points *f*, *g*, *h*, *i*, *k*, and the arch of the baſe in *l*, *m*, *n*, *o*, *p*; from which points draw the lines *l* AF, *m* BG, *n* CH, *o* DI, *p* EK, as if they were rays of light that came from the focus R, and were reflected from the baſe *l n p*; ſo that each couple, *l* A, *l* R, produced, may cut off equal ſegments from the circle. Laſtly, Transfer the lines *l a f*, *m b g*, &c. and all their parts in the ſame order, upon the reſpective lines *l* AF, *m* BG, &c. and having drawn regular curves, by eſtimation, through the points A, B, C, D, E, through F, G, H, I, K, and through every intermediate order of points; the figure ACEKHF, ſo divided, will be the deformed copy of the ſquare, drawn and divided upon the original picture, and will appear ſimilar to it, when ſeen in the poliſhed cylinder, placed upon the baſe *l n p*, by the eye in its given place O. Fig 39.

The practical methods of drawing theſe images ſeem to have been carried to the greateſt perfection by J. Leopold, who, in the Acta Lipſienſia for the year 1712, has deſcribed two machines, one for the images to be viewed with a cylindrical, and the other with a conical mirror. The perſon poſſeſſed of this inſtrument has nothing to do but to take any print he pleaſes, and while he goes over the outlines of it with one pen, another traces the anamorphoſis.

By methods of this kind, groves of trees may be cut, ſo as to repreſent the appearance of men, horſes, and other objects from ſome one point of view, which are not at all diſcernible in any other. This might eaſily be effected by one perſon placing himſelf in any particular ſituation, and giving directions to other perſons what trees to lop, and in what manner. In the ſame method it has been contrived, that buildings of circular and other forms, and alſo whole groups of buildings conſiſting of walls at different diſtances and with different poſitions to one another, ſhould be painted ſo as to exhibit the exact repreſentation of particular objects, which could only be perceived in one ſituation. Bettinus has illuſtrated this method by drawings in his *Apiaria*.

It may appear a bold aſſertion to ſay, that the very ſhort ſketch now given of the art of perſpective is a ſufficient foundation for the whole practice, and includes *all* the expeditious rules peculiar to the problems which moſt generally occur. It is, however, true, and the intelligent reader will ſee, that the two theorems on which the [illegible] apply with equal facility to pictures and cielings in any poſition, a [illegible] of perſpective and pictures [illegible] reduced to [illegible] points, is being the moſt perfect. The [illegible] ing [illegible], the [illegible] need not be [illegible], nor ſwelled into ſuch volumes as have been publiſhed on the ſubject: volumes which by their ſize deter from the peruſal, and give the [illegible] the appearance of intricate myſtery; and [illegible] defeat the deſign of their authors, viz. the diſſemination of knowledge among the practitioners. The treatiſes on perſpective acquire their bulk by long and tedious directions, minute explanations of common things, or by great numbers of examples; which indeed can make ſome of theſe books valuable by the variety of the caſes, but cannot at all inſtruct the reader by any improvements made in the art itſelf. For it is evident that moſt of thoſe who have treated this ſubject have been more converſant in the practice of deſigning than in the principles of geometry; and therefore when, in their practice, the caſes which have occurred have put them on trying particular expedients, they have thought them worth communicating to the public as improvements in the art; and each author, fond of his own little expedient, (which a ſcientific perſon would have known for an eaſy corollary from the general theorem), has made it the principle of a practical ſyſtem—in this manner narrowing inſtead of enlarging the knowledge of the art; and the practitioner tired of the bulk of the volume, in which a ſingle maxim is tediouſly ſpread out, and the principle on which it is founded kept out of his ſight, contents himſelf with a remembrance of the maxim (not underſtood), and keeps it ſlightly in his eye to avoid groſs errors. We can appeal to the whole body of painters and draughtſmen for the truth of this aſſertion; and it muſt not be conſidered as an imputation on them of remiſſneſs or negligence, but as a neceſſary conſequence of the ignorance of the authors from whom they have taken their information. This is a ſtrong term, but it is not the leſs juſt. Several mathematicians of eminence have written on perſpective, treating it as the ſubject of pure geometry, as it really is; and the performances of Dr Brook Taylor, Graveſande, Wolf, De la Caille, Emerſon, are truly valuable, by preſenting the art in all its perſpicuous ſimplicity and univerſality. The works of Taylor and Emerſon are more valuable, on account of the very ingenious and expeditious conſtructions which they have given, ſuited to every poſſible caſe. The merit of the firſt author has been univerſally acknowledged by all the Britiſh writers on the ſubject, who never fail to declare that their own works are compoſed on the principle of Dr Brook Taylor; but any man of ſcience will ſee that theſe authors have either not underſtood them, or aimed at pleaſing the public by fine cuts and uncommon caſes; for without exception, they have omitted his favourite conſtructions, which had gained his predilection by their univerſality, and attached themſelves to inferior methods, more uſually expedient perhaps, or inventions (as they thought) of their own. What has been given in this article is not profeſſed to be according to the principles of Dr Brook Taylor, becauſe the principles are not peculiar to him, but the neceſſary reſults of the theory itſelf, and inculcated by every author who underſtands the ſubject; to [illegible] the ſubject. They are [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. And a perſon of [illegible] [illegible] in [illegible] [illegible] [illegible] [illegible] [illegible] with [illegible] in reading the tedious explanation of examples deviſed by another. And for this purpoſe we would, with Dr Taylor, "adviſe all our readers not to be contented with the theory they find here; but, on every occaſion, to draw new ſchemes of their own, in all the variety of circumſtances they can think of. This will take up more time at firſt, but they will find the vaſt benefit and pleaſure of it by the extenſive notions it will give them of the nature of the principles."

The art of perſpective is neceſſary to all arts where there is any occaſion for deſigning; as architecture, fortification, carving, and generally all the mechanical arts; but it is more particularly neceſſary to the art of painting, which can do nothing without it. A figure in a picture, which is not drawn according to the rules of perſpective, does not repreſent what is intended, but ſomething elſe. Indeed we heſitate not to ſay, that a picture which is faulty in this particular, is as blameable, or more ſo, than any compoſition in writing which is faulty in point of orthography, or grammar. It is generally thought very ridiculous to pretend to write a heroic poem, or a fine diſcourſe, upon any ſubject, without underſtanding the propriety of the language in which we write: and to us it ſeems no leſs ridiculous for one to pretend to make a good picture without underſtanding perſpective: Yet how many pictures are there to be ſeen, that are highly valuable in other reſpects, and yet are entirely faulty in this point? Indeed this fault is ſo very general, that we cannot remember that we ever have ſeen a picture that has been entirely without it; and what is the more to be lamented, the greateſt maſters have been the moſt guilty of it. Thoſe examples make it to be the leſs regarded; but the fault is not the leſs, but the more to be lamented, and deſerves the more care in avoiding it for the future. The great occaſion of this fault, is certainly the wrong method that is generally uſed in educating of perſons in this art: for the young people are generally put immediately to drawing; and when they have acquired a facility in that, they are put to colouring. And theſe things they learn by rote, and by practice only; but are not at all inſtructed in any rules of art. By which means, when they come to make any deſigns of their own, though they are very expert at drawing out and colouring every thing that offers itſelf to their fancy; yet for want of being inſtructed in the ſtrict rules of art, they do not know how to govern their inventions with judgement, and become guilty of [illegible] groſs miſtakes [illegible] themſelves, as well as [illegible] from [illegible] they otherwiſe would do in their performances. To correct this for the future, we would recommend it to the maſters of the art of painting, to conſider if it would not be neceſſary to eſtabliſh a better method for the education of their ſcholars, and to begin their inſtructions with the technical parts of painting, before they let them looſe to follow the inventions of their own uncultivated imaginations.

The art of painting, taken in its full extent, conſiſts of two parts; the inventive, and the executive. The inventive part is common with poetry, and belongs more properly and immediately to the original deſign (which it invents and diſpoſes in the moſt proper and agreeable manner) than to the picture, which is only a copy of that deſign already formed in the imagination of the artiſt. The perfection of this art of painting depends upon the thorough knowledge the artiſt has of all the parts of his ſubject; and the beauty of it conſiſts in the happy choice and diſpoſition that he makes of it: And it is in this that the genius of the artiſt diſcovers and ſhows itſelf, while he indulges and humours his fancy, which here is not confined. But the other, the executive part of painting, is wholly confined and ſtrictly tied to the rules of art, which cannot be diſpenſed with upon any account; and therefore in this the artiſt ought to govern himſelf entirely by the rules of art, and not to take any liberties whatſoever. For any thing that is not truly drawn according to the rules of perſpective, or not truly coloured or truly ſhaded, does not appear to be what the artiſt intended, but ſomething elſe. Wherefore, if at any time the artiſt happens to imagine that his picture would look the better, if he ſhould ſwerve a little from theſe rules, he may aſſure himſelf, that the fault belongs to his original deſign, and not to the ſtrictneſs of the rules; for what is perfectly agreeable and juſt in the real original objects themſelves, can never appear defective in a picture where thoſe objects are exactly copied.

Therefore to offer a ſhort hint of thoughts we have ſome time had upon the method which ought to be followed in inſtructing a ſcholar in the executive part of painting: we would firſt have him learn the moſt common effections of practical geometry, and the firſt elements of plain geometry and common arithmetic. When he is ſufficiently perfect in theſe, we would have him learn perſpective. And when he has made ſome progreſs in this, ſo as to have prepared his judgement with the right notions of the alterations that figures muſt undergo, when they come to be drawn on a flat, he may then be put to drawing by view, and be exerciſed in this along with perſpective, till he comes to be ſufficiently perfect in both. Nothing ought to be more familiar to a painter than perſpective; for it is the only thing that can make the judgement correct, and will help the fancy to invent with ten times the eaſe that it could do without it.

We earneſtly recommend to our readers the *careful* peruſal of Dr Taylor's Treatiſe, as publiſhed by Colſon in 1749, and Emerſon's publiſhed along with his Optics. They will be ſurpriſed and delighted with the inſtruction they will receive; and will then truly eſtimate the ſplendid volumes of other authors and ſee their frivolity.

PERSPECTIVE is alſo uſed for a kind of picture or painting, frequently ſeen in gardens, and at the ends of galleries; deſigned expreſsly to deceive the ſight by repreſenting the continuation of an alley, a building, landſcape, or the like.

Aerial PERSPECTIVE, is ſometimes uſed as a general denomination for that which more reſtrictedly is called *aerial perſpective*, or the art of giving a due diminution or degradation to the ſtrength of light, ſhade, and colours of objects, according to their different diſtances, the quantity of light which falls upon them, and the medium through which they are ſeen; the *chiaro obſcuro*, or *clair obſcure*, which conſiſts in expreſſing the different degrees of light, ſhade, and colour of bodies, ariſing from their own ſhape, and the poſition of their parts with reſpect to the eye and neighbouring objects, whereby their light or colours are affected; and keeping, which is the obſervance of a due proportion in the general light and colouring of the whole picture, ſo that no light or colour in one part may be too bright or ſtrong for another. A painter, who would ſucceed in *aerial perſpective*, ought carefully to ſtudy the effects which diſtance, or different degrees or colours of light, have on each particular original colour, to know how its hue or ſtrength is changed in the ſeveral circumſtances that occur, and to repreſent it accordingly. As all objects in a picture take their meaſures in proportion to thoſe placed in the front, ſo, in *aerial perſpective*, the ſtrength of light, and the brightneſs of the colours of objects cloſe to the picture, muſt ſerve as a meaſure, with reſpect to which all the ſame colours at ſeveral diſtances muſt have a proportional degradation in like circumſtances.

Bird's eye view in PERSPECTIVE, is that which ſuppoſes the eye to be placed above any building, &c. as in the air at a conſiderable diſtance from it. This is applied in drawing the repreſentations of fortifications, when it is neceſſary not only to exhibit one view as ſeen from the ground, but ſo much of the ſeveral buildings as the eye can poſſibly take in at one time from any ſituation. In order to this, we muſt ſuppoſe the eye to be removed a conſiderable height above the ground, and to be placed as it were in the air, ſo as to look down into the building like a bird that is flying. In repreſentations of this kind, the higher the horizontal line is placed, the more of the fortification will be ſeen, and *vice verſa*.

PERSPECTIVE *Machine*, is an inſtrument by which any perſon, without the help of the rules of art, may delineate the true perſpective figures of objects. Mr Ferguſon has deſcribed a machine of this ſort of which he aſcribes the invention to Dr Bevis.

Fig. 45. is a plan of this machine, and fig. 46. is a repreſentation of it when made uſe of in drawing diſtant objects in perſpective. Fig. 45. and 46.

In fig. 45. *a b e f* is an oblong ſquare board, repreſented by ABEF in fig. 46. *x* and *y* (X and Y) are two hinges on which the part *c l d* (CLD) is moveable. This part conſiſts of two arches or portions of circles *c m l* (CML) and *d n l* (DNL) joined together at the top *l* (L), and at bottom to the croſs bar *d c* (DC), to which one part of each hinge is fixed, and the other

Fig. 1.

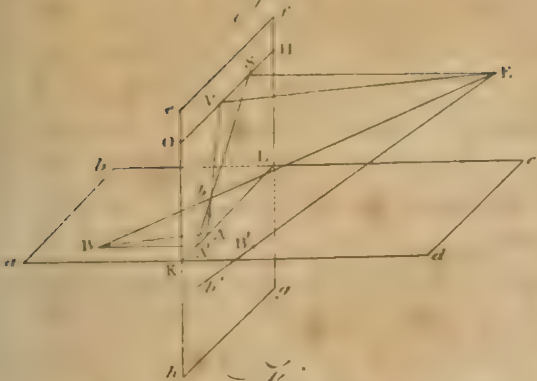


Fig. 2.

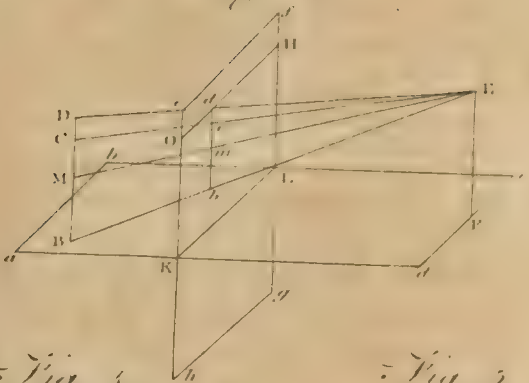


Fig. 3.

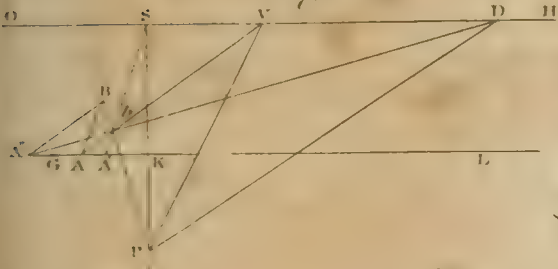


Fig. 4.

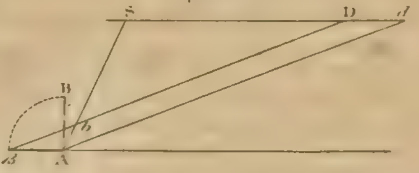


Fig. 5.

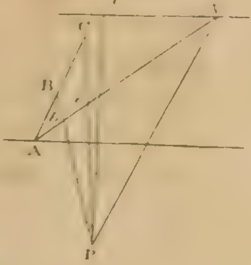


Fig. 6.

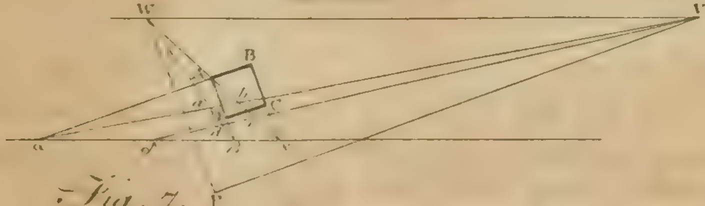


Fig. 7.

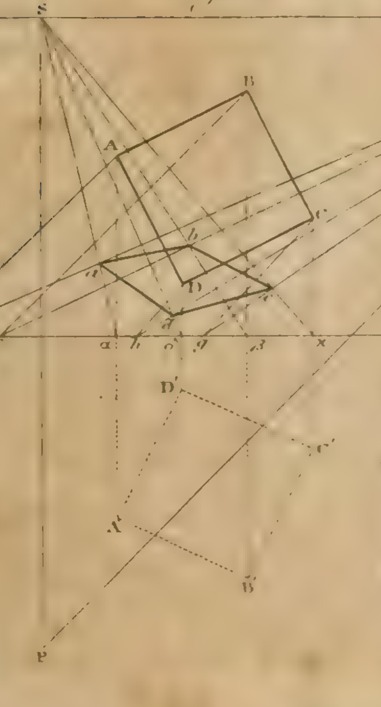


Fig. 8.

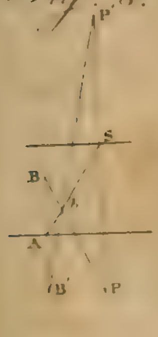


Fig. 9.

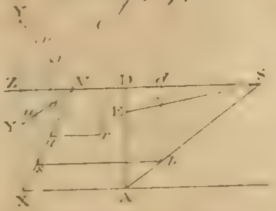


Fig. 10.

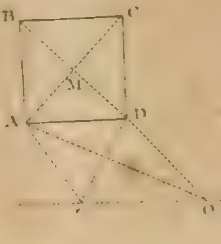


Fig. 11.

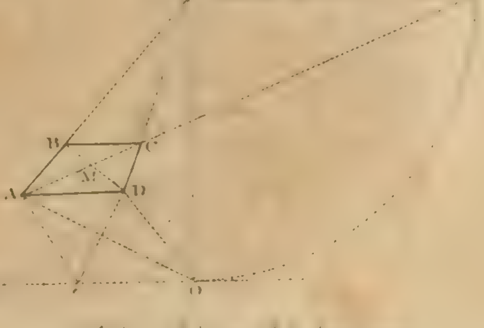
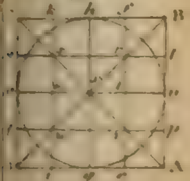


Fig. 12.



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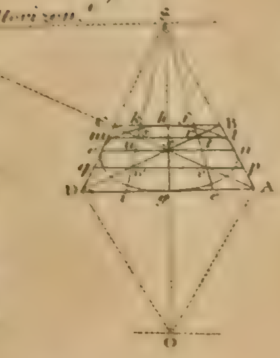

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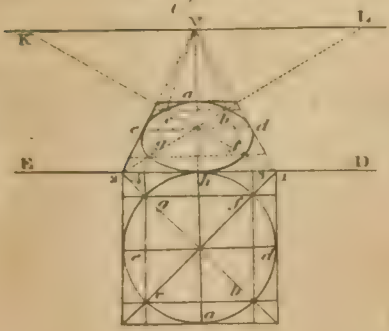

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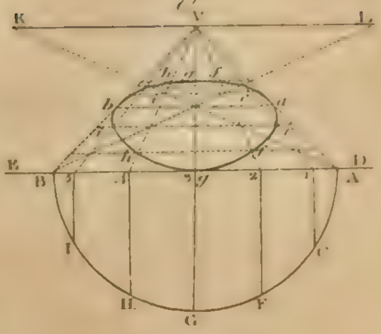

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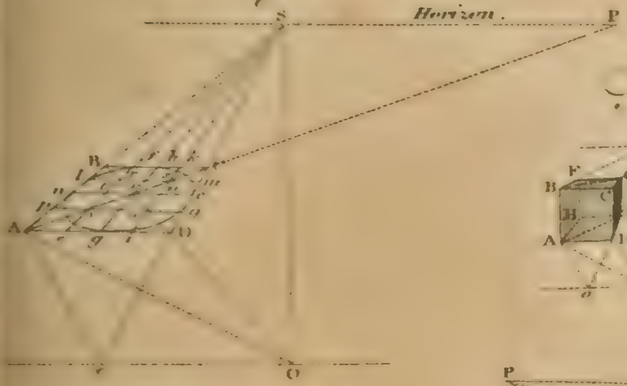

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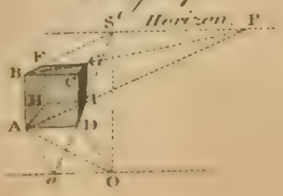

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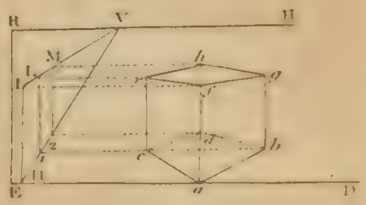

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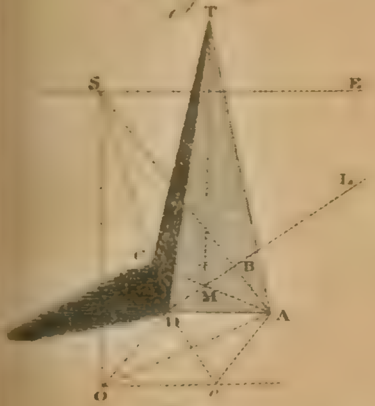

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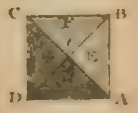

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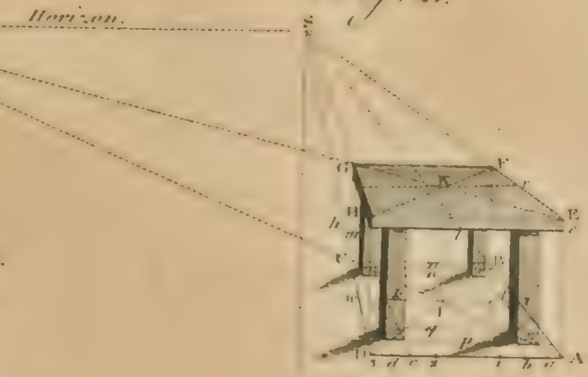

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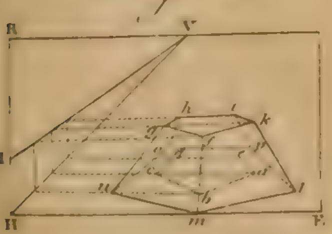

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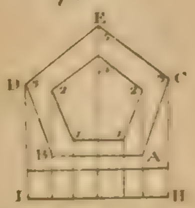

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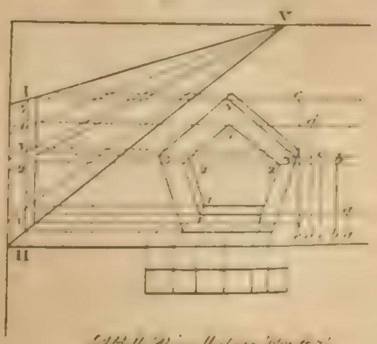
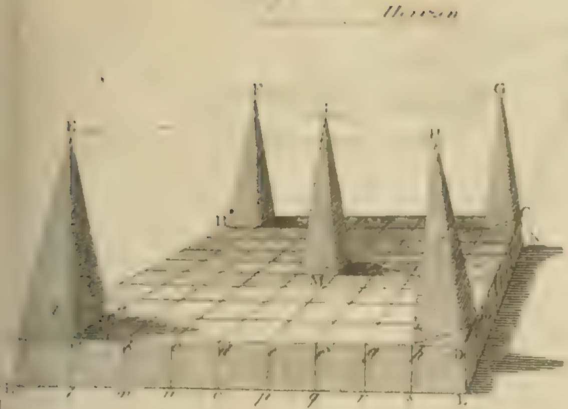


A. Bell Prin. Wal. Sculptor fecit.

Fig. 25.



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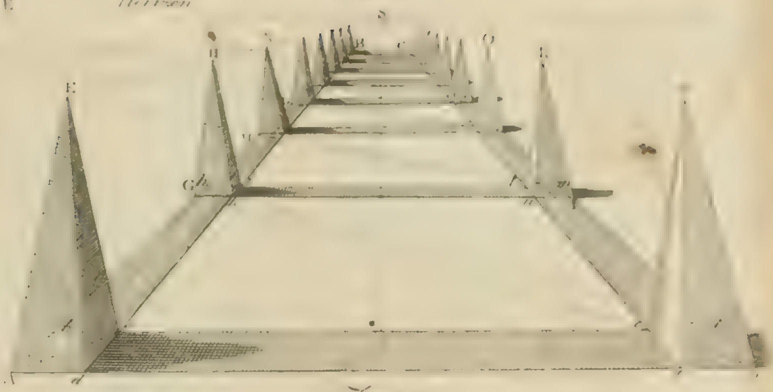

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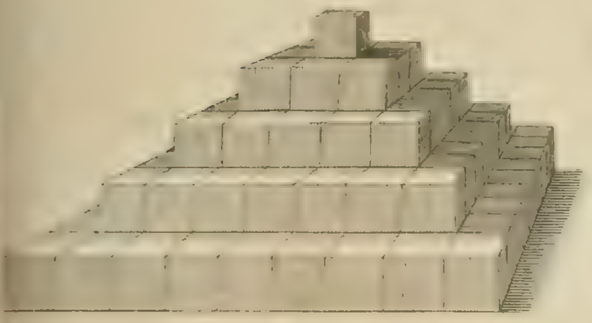

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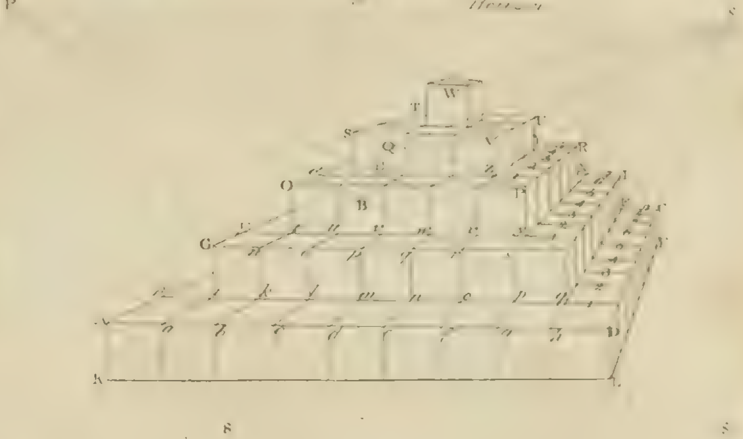

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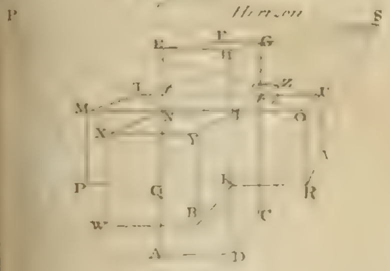

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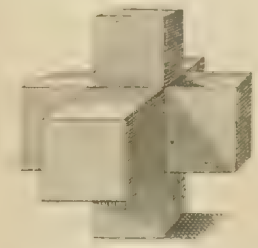

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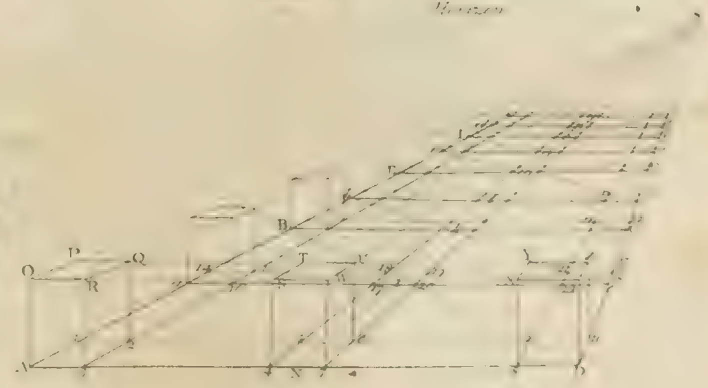
Fig. 32.



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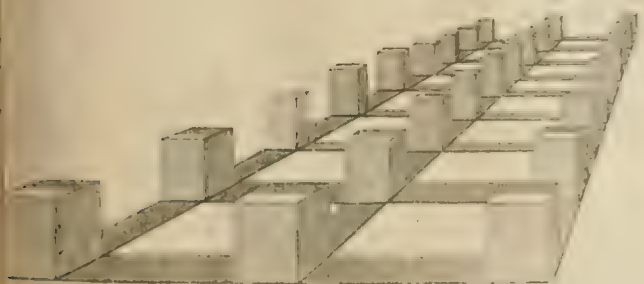

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Fig. 33.

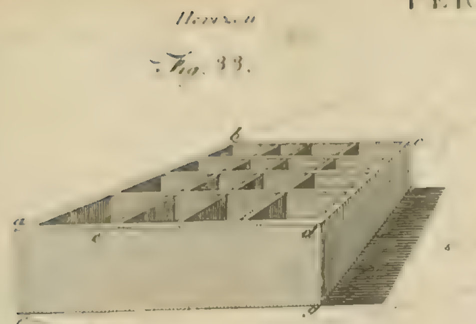


Fig. 34.

Fig. 36.

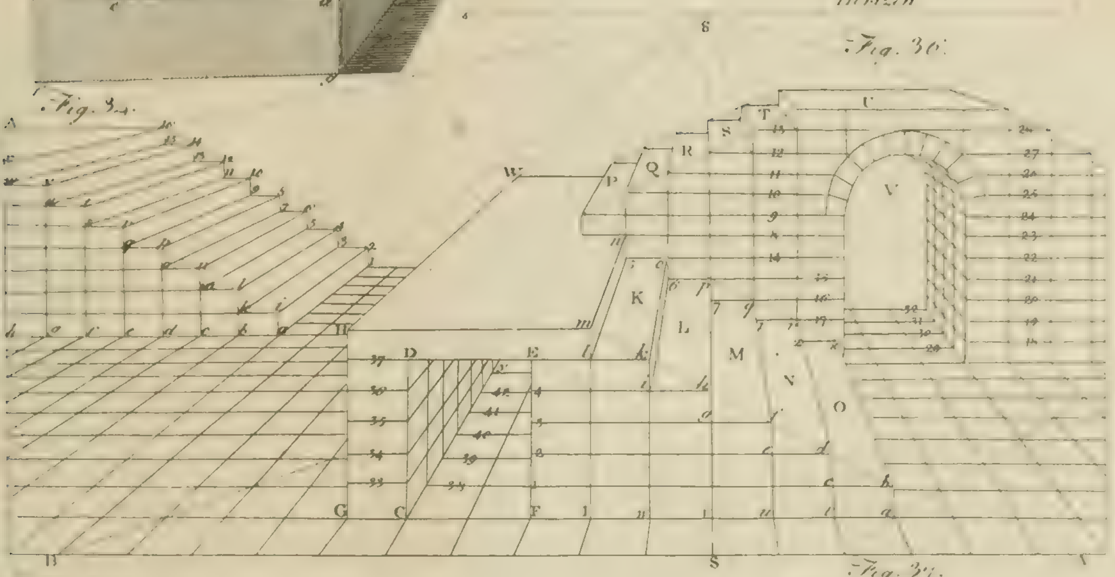
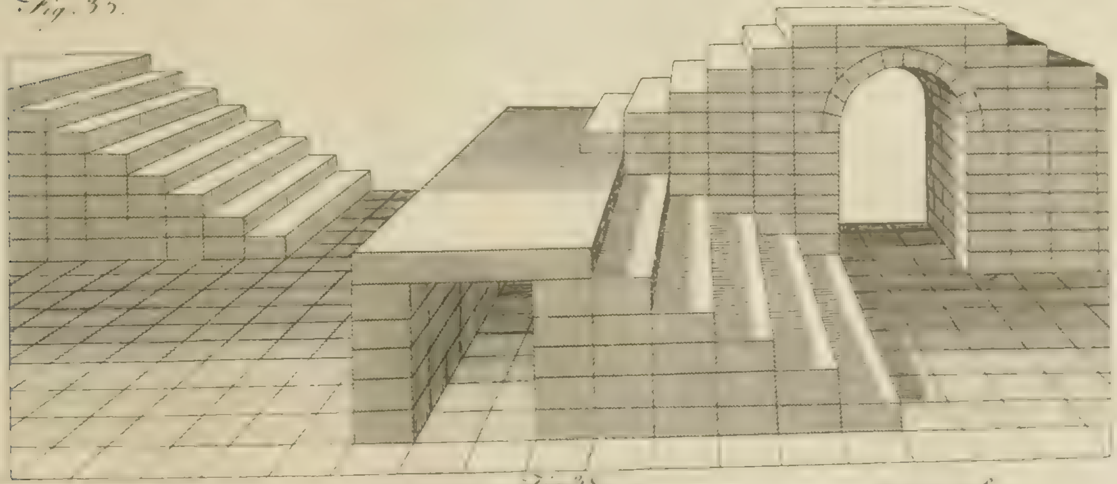


Fig. 35.

Fig. 37.



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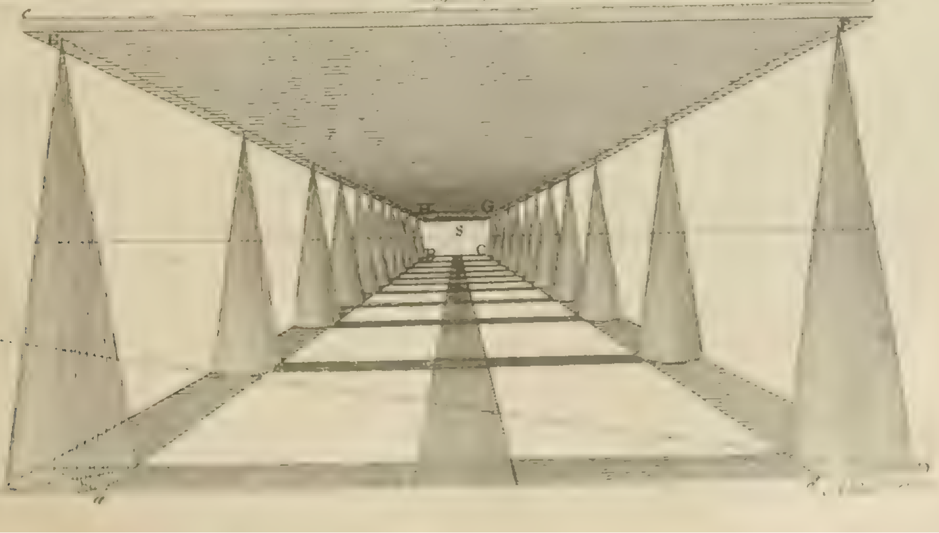

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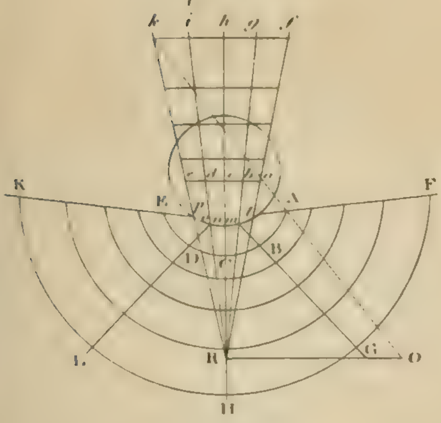

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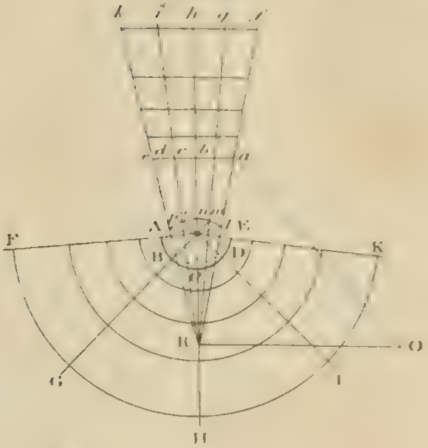

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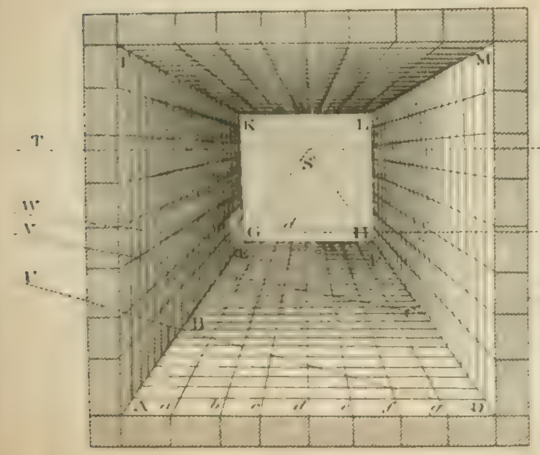

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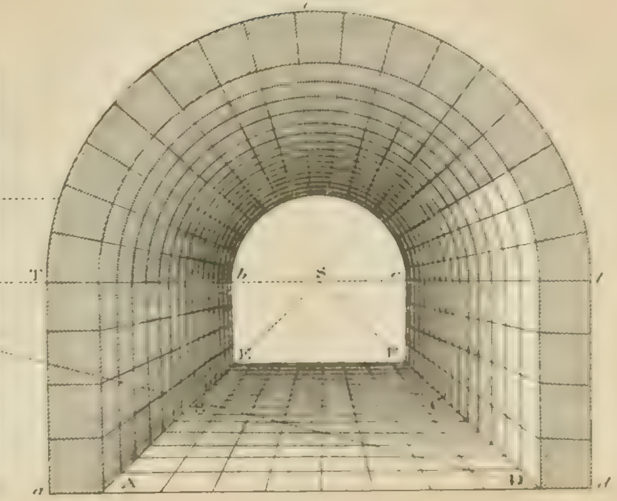

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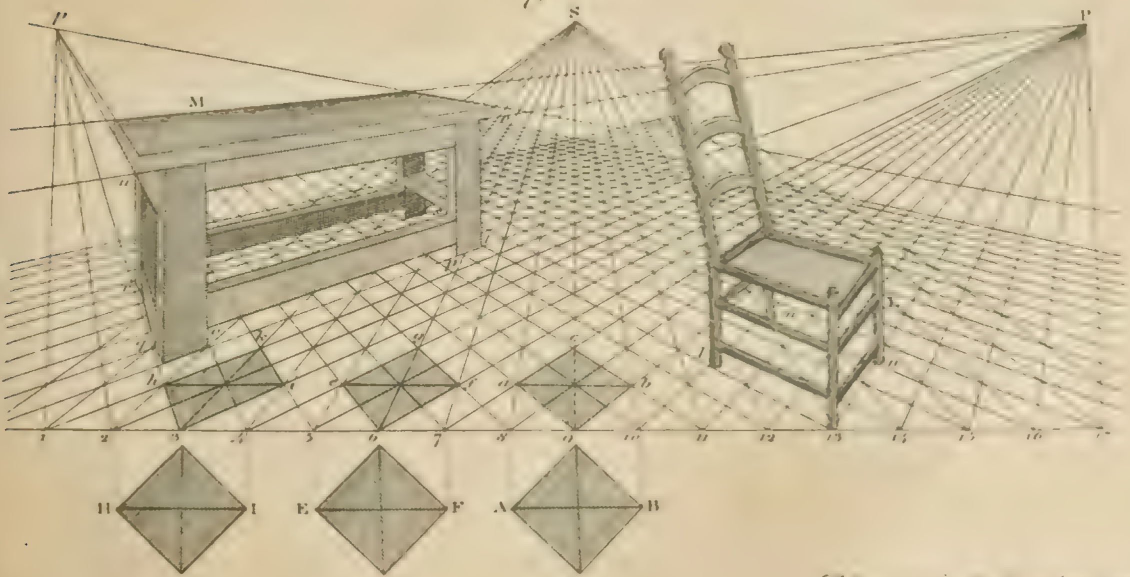
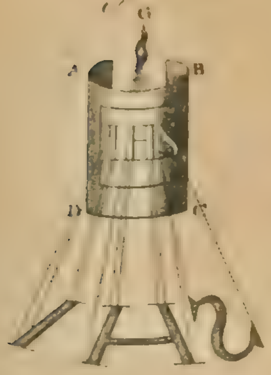


A. Bell Prin. Wal. Sculptor fecit.

Fig. 44.



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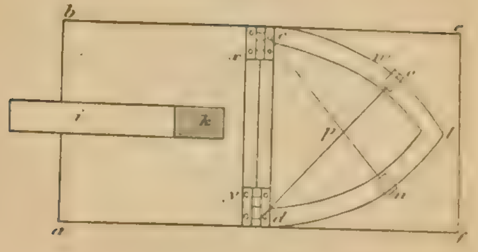


Fig. 46.

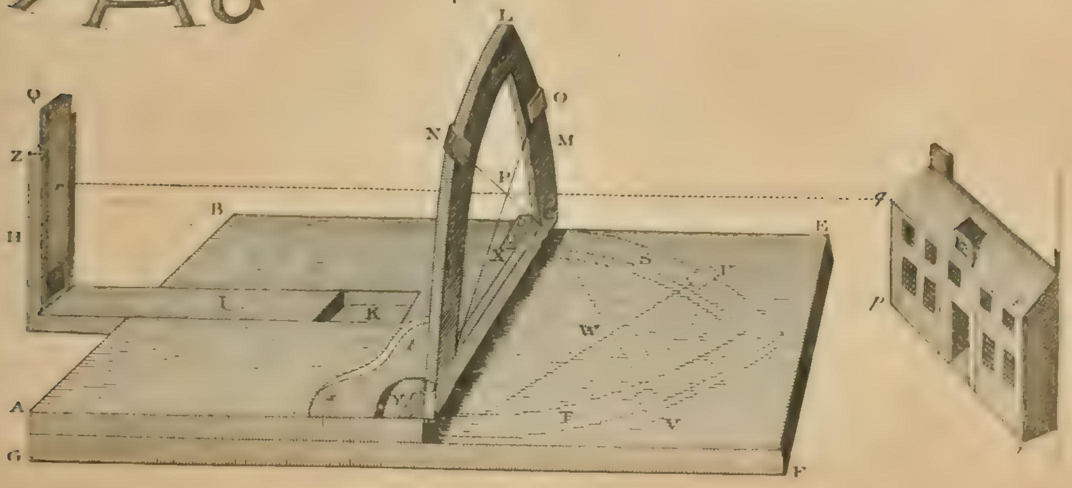


Fig. 47.

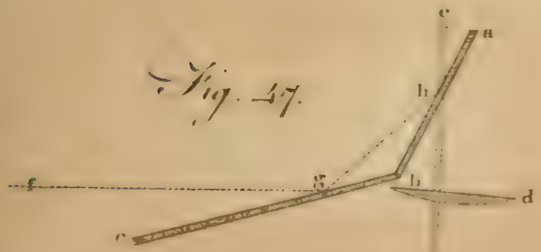


Fig. 48.

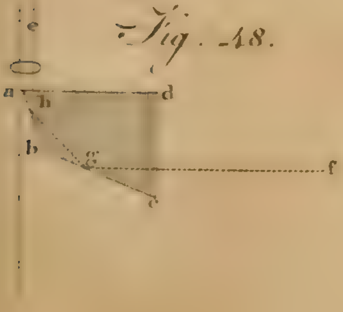
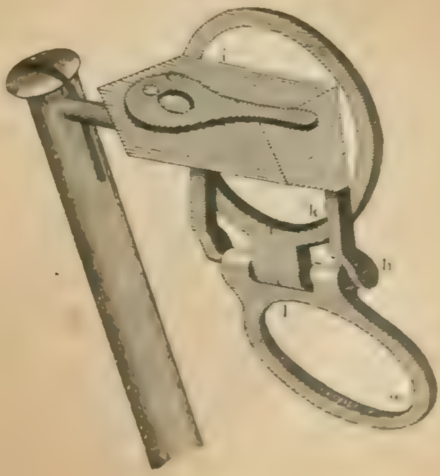


Fig. 49.



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part to a flat board, half the length of the board *abef* (ABEF), and glued to its uppermoſt ſide. The centre of the arch *cml* is at *d*, and the centre of the arch *dnl* is at *c*.

On the outer ſide of the arch *dnl* is a ſliding piece *n* (much like the nut of the quadrant of altitude belonging to a common globe), which may be moved to any part of the arch between *d* and *l*: and there is ſuch another ſlider *o* on the arch *cml*, which may be ſet to any part between *c* and *l*.—A thread *cpn* (CPN) is ſtretched tight from the centre *c* (C) to the ſlider *n* (N), and ſuch another thread is ſtretched from the centre *d* (D) to the ſlider *o* (O); the ends of the thread being faſtened to their centres and ſliders.

Now it is plain, that by moving theſe ſliders on their reſpective arches, the interſection *p* (P) of the threads may be brought to any point of the open ſpace within the arches.—In the groove *k* (K) is a ſtraight ſliding bar *i* (I), which may be drawn further out, or puſhed farther in at pleaſure.

To the outer end of this bar I (fig. 46.) is fixed the upright piece HZ, in which is a groove for receiving the ſliding piece Q. In this ſlider is a ſmall hole *r* for the eye to look through, in uſing the machine: and there is a long ſlit in HZ, to let the hole *r* be ſeen through when the eye is placed behind it, at any height of the hole above the level of the bar I.

How to delineate the perſpective figure of any diſtant object or objects, by means of this machine.

Suppoſe you wanted to delineate a perſpective repreſentation of the houſe *qsrp* (which we muſt imagine to be a great way off, without the limits of the plate), place the machine on a ſteady table, with the end EF of the horizontal board ABEF toward the houſe, ſo that, when the Gothic-like arch DLC is ſet upright, the middle part of the open ſpace (about P) within it may be even with the houſe when you place your eye at Z and look at the houſe through the ſmall hole *r*. Then fix the corners of a ſquare piece of paper with four wafers on the ſurface of that half of the horizontal board which is neareſt the houſe; and all is ready for drawing.

Set the arch upright, as in the figure; which it will be when it comes to the perpendicular ſide *t* of the upright piece *st* fixed to the horizontal board behind D. Then place your eye at Z, and look through the hole *r* at any point of the houſe, as *q*, and move the ſliders N and O till you bring the interſection of the threads at P directly between your eye and the point *q*: then put down the arch flat upon the paper on the board, as at ST, and the interſection of the threads will be at W. Mark the point W on the paper with the dot of a black lead pencil, and ſet the arch upright again as before: then look through the hole *r*, and move the ſliders N and O till the interſection of the threads comes between your eye and any other point of the houſe, as *p*: then put down the arch again to the paper, and make a pencil mark thereon at the interſection of the threads, and draw a line from that mark to the former one at W; which line will be a true perſpective repreſentation of the corner *pq* of the houſe.

Proceed in the ſame manner, by bringing the interſection of the threads ſucceſſively between your eye and other points of the outlines of the houſe, as *r*, *s*, &c. and put down the arch to mark the like points on the paper, at the interſection of the threads: then connect theſe points by ſtraight lines, which will be the perſpective outlines of the houſe. In like manner find points for the corners of the door and windows, top of the houſe, chimneys, &c. and draw the finiſhing lines from point to point: then ſhade the whole, making the lights and ſhades as you ſee them on the houſe itſelf, and you will have a true perſpective figure of it.—Great care muſt be taken, during the whole time, that the poſition of the machine be not ſhifted on the table: and to prevent ſuch an inconvenience, the table ſhould be very ſtrong and ſteady, and the machine fixed to it either by ſcrews or clamps.

In the ſame way, a landſcape, or any number of objects within the field of view through the arch, may be delineated, by finding a ſufficient number of perſpective points on the paper, and connecting them by ſtraight or curved lines as they appear to the eye. And as this makes every thing in perſpective equally eaſy, without taking the trouble to learn any of the rules for drawing, the operations muſt be very pleaſing and agreeable. Yet as ſcience is ſtill more ſo, we would by all means recommend it to our readers to learn the rules for drawing particular objects; and to draw landſcapes by the eye, for which, we believe, no perſpective rules can be given. And although any thing may be very truly drawn in perſpective by means of this machine, it cannot be ſaid that there is the leaſt degree of ſcience in going *that* way to work.

The arch ought to be at leaſt a foot wide at bottom, that the eye at Z may have a large field of view through it: and the eye ſhould then be, at leaſt, 10½ inches from the interſection of the threads at P when the arch is ſet upright. For if it be nearer, the boundaries of view at the ſides near the foot of the arch will ſubtend an angle at Z of more than 60 degrees, which will not only ſtrain the eye, but will alſo cauſe the outermoſt parts of the drawing to have a diſagreeable appearance. —To avoid this, it will be proper to draw back the ſliding bar I, till Z be 14½ inches diſtant from P; and and then the whole field of view, through the foot wide arch, will not ſubtend an angle to the eye at Z of more than 45 degrees; which will give a more eaſy and pleaſant view, not only of all the objects themſelves, but alſo of their repreſentations on the paper whereon they are delineated. So that, whatever the width of the arch be, the diſtance of the eye from it ſhould be in this proportion: As 12 is to the width of the arch, ſo is 14½ to the diſtance of the eye (at Z) from it.

If a pane of glaſs, laid over with gum-water, be fixed into the arch, and ſet upright when dry, a perſon who looks through the hole *r* may delineate the objects upon the glaſs which he ſees at a diſtance through and beyond it, and then transfer the delineation to a paper put upon the glaſs, as mentioned in the beginning of the article Perspective.

Mr Peacock likewiſe invented three ſimple inſtruments for drawing architecture and machinery in perſpective, of which the reader will find ſketches and deſcriptions in the 75th volume of the Philoſophical Tranſactions. Theſe deſcriptions are not inſerted here; becauſe we do not think the inſtruments ſuperior to that deſcribed by Ferguſon, and becauſe we wiſh that the readers who have occaſion to [illegible] ſhould learn the art of perſpective [illegible] the aid of ſuch mechanical contrivances. But for the ſake of thoſe whoſe opportunities of improvement in the art do not enable them to practiſe it without ſuch helps, we annex the following deſcription of an inſtrument invented for this purpoſe by Dr Wollaſton, to which he has given the name of *Camera Lucida*.

" Having a ſhort time ſince (ſays the author) amuſed myſelf with attempts to ſketch various intereſting views, without an adequate knowledge of the art of drawing, my mind was naturally employed in facilitating the means of transferring to paper the apparent relative poſitions of the objects before me ; and I am in hopes that the inſtrument, which I contrived for this purpoſe, may be acceptable even to thoſe who have attained to greater proficiency in the art, on account of the many advantages it poſſeſſes over the camera obſcura.

" The principles on which it is conſtructed will probably be moſt diſtinctly explained by tracing the ſucceſſive ſteps, by which I proceeded in its formation.

" While I look directly down at a ſheet of paper on my table, if I hold between my eye and the paper a piece of plain glaſs, inclined from me downwards at an angle of 45°, I ſee by reflection the view that is before me, in the ſame direction that I ſee my paper through the glaſs. I might then take a ſketch of it ; but the poſition of the objects would be reverſed.

" To obtain a direct view, it is neceſſary to have two reflections. The tranſparent glaſs muſt for this purpoſe be inclined to the perpendicular line of ſight only the half of 45°, that it may reflect the view a ſecond time from a piece of looking-glaſs placed beneath it, and inclined upwards at an equal angle. The objects now appear as if ſeen through the paper in the ſame place as before ; but they are direct inſtead of being inverted, and they may be diſcerned in this manner ſufficiently well for determining the principal poſitions.

" The pencil, however, and any object, which it is to trace, cannot both be ſeen diſtinctly in the ſame ſtate of the eye, on account of the difference of their diſtances, and the efforts of ſucceſſive adaption of the eye to one or to the other, would become painful if frequently repeated. In order to remedy this inconvenience, the paper and pencil may be viewed through a convex lens of ſuch a focus, as to require no more effort than is neceſſary for ſeeing the diſtant objects diſtinctly. Theſe will then appear to correſpond with the paper in *diſtance* as well as *direction*, and may be drawn with facility, and with any deſired degree of preciſion.

" This arrangement of glaſſes will be beſt underſtood from inſpecting fig. 47. *a b* in the tranſparent glaſs ; *b c* the lower reflector ; *b d* a convex lens (of 12 inches focus) ; *e* the poſition of the eye ; and *f g h e* the courſe of the rays.

" In ſome caſes a different conſtruction will be preferable. Thoſe eyes, which without aſſiſtance are adapted to ſeeing near objects alone, will not admit the uſe of a convex glaſs ; but will on the contrary require one that is concave to be placed in front, to render the diſtant objects diſtinct. The frame for a glaſs of this conſtruction is repreſented at *i k*, (fig. 49.) turning upon the ſame hinge at *h* with a convex glaſs in the frame *l m*, and moving in ſuch a manner, that either of the glaſſes may be turned alone into its place, as may be neceſſary to ſuit an eye that is long or ſhort ſighted. Thoſe perſons, however, whoſe ſight is nearly perfect, may at pleaſure uſe either of the glaſſes.

" The inſtrument repreſented in that figure differs moreover in other reſpects from the foregoing, which I have choſen to deſcribe firſt, becauſe the action of the reflectors there employed would be more generally underſtood. But thoſe who are converſant with the ſcience of optics will perceive the advantage that may be derived in this inſtance from priſmatic reflection ; for when a ray of light has entered a ſolid piece of glaſs, and falls from within upon any ſurface, at an inclination of only twenty-two or twenty-three degrees, as above ſuppoſed, the refractive power of the glaſs is ſuch as to ſuffer none of that light to paſs out, and the ſurface becomes in this caſe the moſt brilliant reflector that can be employed.

" Fig. 48. repreſents the ſection of a ſolid priſmatic piece of glaſs, within which both the reflections requiſite are effected at the ſurfaces *a b*, *b c*, in ſuch a manner that the ray *f g*, after being reflected firſt at *g*, and again at *h*, arrives at the eye in a direction *h e* at right angles to *f g*.

" There is another circumſtance in this conſtruction neceſſary to be attended to, and which remains to be explained. Where the reflection was produced by a piece of plain glaſs, it is obvious that any objects behind the glaſs (if ſufficiently illuminated) might be ſeen through the glaſs as well as the reflected image. But when the priſmatic reflector is employed, ſince no light can be tranſmitted directly through it, the eye muſt be ſo placed that only a part of its pupil may be intercepted by the edge of the priſm, as at *e*, fig. 48. The diſtant objects will then be ſeen by this portion of the eye, while the paper and pencil are ſeen paſt the edge of the priſm by the remainder of the pupil.

" In order to avoid inconvenience that might ariſe from unintentional motion of the eye, the relative quantities of light to be received from the object, and from the paper, are regulated by a ſmall hole in a piece of braſs, which by moving on a centre at *c*, fig. 49. is capable of adjuſtment to every inequality of light that is likely to occur.

" Since the ſize of the whole inſtrument, from being ſo near the eye, does not require to be large, I have on many accounts preferred the ſmalleſt ſize that could be executed with correctneſs, and have had it conſtructed on ſuch a ſcale, that the lenſes are only three fourths of an inch in diameter.

" Though the original deſign, and principal uſe of this inſtrument is to facilitate the delineation of objects in true perſpective, yet this is by no means the ſole purpoſe to which it is adapted ; for the ſame arrangement of reflectors may be employed with equal advantage for copying what has been already drawn, and may thus aſſiſt a learner in acquiring at leaſt a correct outline of any ſubject.

" For this purpoſe the drawing to be copied ſhould be placed as nearly as may be at the ſame diſtance before the inſtrument that the paper is beneath the eye-hole, for in that caſe the ſize will be the ſame, and no lens will be neceſſary either to the object, or to the pencil.

" By a proper uſe of the ſame inſtrument, every purpoſe of the pentagraph may alſo be anſwered ; as a painting may be reduced in any proportion required, by placing it at a diſtance in due proportion greater than that of the paper from the inſtrument. In this caſe a lens becomes requiſite for enabling the eye to ſee at two unequal diſtances with equal diſtinctneſs, and in order that one lens may ſuit for all theſe purpoſes, there is an advantage in carrying the height of the ſtand according to the proportion in which the reduction is to be effected.

"The principles on which the height of the ſtem is adjuſted will be readily underſtood by thoſe who are accuſtomed to optical conſiderations. For as in taking a perſpective view the rays from the paper are rendered *parallel*, by placing a lens at the diſtance of its *principal* focus from the paper, becauſe the rays received from the diſtant objects are *parallel*; ſo alſo when the object ſeen by reflection is at ſo ſhort a diſtance that the rays received from it are in a certain degree *divergent*, the rays from the paper ſhould be made to have the ſame degree of divergency in order that the paper may be ſeen diſtinctly by the ſame eye; and for this purpoſe the lens muſt be placed at a diſtance leſs than its principal focus. The ſtem of the inſtrument is accordingly marked at certain diſtances to which the conjugate foci are in the ſeveral proportions of 2, 3, 4, &c. to 1, ſo that diſtinct viſion may be obtained in all caſes, by placing the painting proportionally more diſtant.

"By tranſpoſing the convex lens to the front of the inſtrument and reverſing the proportional diſtances, the artiſt might alſo enlarge his ſmaller ſketches with every deſirable degree of correctneſs, and the naturaliſt might delineate minute objects in any degree magnified."

PERSPECTIVE Glaſs, or *Graphical Perſpective*. See DIOPTRICS.

PERSPIRATION, in *Phyſiology*, the excretion of a fluid through the pores of the ſkin. Perſpiration is diſtinguiſhed into ſenſible and inſenſible; and here ſenſible perſpiration is the ſame with ſweating, and inſenſible perſpiration that which eſcapes the notice of the ſenſes.

PERSPICUITY, properly ſignifies the property which any thing has of being eaſily ſeen through; hence it is generally applied to ſuch writings or diſcourſes as are eaſily underſtood.

PERSPICUITY, in compoſition. See ORATORY, Nº 43.

PERTH, a county of Scotland, including Menteith, Braidalbin, Athol, Stratherne, part of Gowrie, and Perth Proper; is bounded by Badenoch and Lochaber on the north and north-weſt; by Marr on the north-eaſt; by Argyle and Lennox on the weſt and ſouth-weſt; having Clackmannanſhire, part of Stirlingſhire, and the Forth to the ſouth; the ſhires of Kinroſs and Fife to the ſouth-eaſt, and Angus to the eaſt. It extends above 70 miles in length, and near 60 at its greateſt breadth, exhibiting a variety of Highlands and Lowlands; mountains, hills, dales, and ſtraths, diverſified with paſture grounds, corn fields, and meadows; rivers, lakes, foreſts, woods, plantations, incloſures, towns, villages, and a great number of elegant ſeats, beautifully ſituated, belonging to noblemen and gentlemen. The chief rivers of Perthſhire are the Tay, the Teith, and the Erne, beſides a great number of ſubordinate ſtreams. The river Tay is famous for its ſalmon-fiſhery. The river Erne riſes from Loch Erne, a lake ſeven miles long, in the mountainous country of Stratherne: this river, after a courſe of 34 miles from weſt to eaſt, during which it receives many ſtreams and rivulets, falls into the Tay at Abernethy.

"The Tay (ſays a late traveller), on the ſouthern bank of which the city of Perth ſtands, is truly a noble river. It riſes in Braidalbin, on the frontiers of Lorne. Before it has advanced many miles from its ſource, its ſtream is conſiderably augmented by the acceſſion of ſeveral ſmall rills. Soon after, it diffuſes its waters into a ſmall lake called Loch Dochart; and indeed the river itſelf there bears rather the name of the Dochart. Continuing its courſe from Loch Dochart, it ſoon again expands into another lake. Out of this it proceeds to Killin, ſtill bearing, if I remember right, the name of the Dochart. Here it meets with another river which flows hither by a more north eaſterly courſe. The waters are diffuſed into the famous Loch Tay, 16 miles in length. Iſſuing from this ſpacious lake at Kenmore, the Tay is ſoon after increaſed by the acceſſion of the Lyon. It proceeds onward in an eaſtern direction through Athol, receiving as it advances all the waters in the country, till at Logierait it is joined by the large river of Tummel. Here it bends to the ſouth, and advancing about eight miles reaches Dunkeld; whence taking a more northern direction, it continues its courſe towards Perth; being as it advances ſtill augmented by the acceſſion of various tributary ſtreams, the moſt conſiderable of which is the Almond. At Perth it turns to the ſouth-eaſt, and receiving as it proceeds the waters of the Erne, paſſes by Abernethy, once the capital of the Pictiſh kingdom. Soon after this, it expands itſelf to the breadth of three miles. Contracting its breadth, as it approaches Dundee, it there opens into the German ocean.

Heron's Tour, 1792.

"Such is the noble river; on the ſouthern bank of which, where it has increaſed into a vaſt body of water, and not a great many miles above where it diſcharges itſelf into the ocean, Perth is advantageouſly ſituated. A perſon acquainted with the general character of great rivers, and with their influence in determining the aſpect and the fertility of the diſtricts through which they paſs, might readily, without farther knowledge of the local circumſtances than what is conveyed in this account of the courſe of the Tay, and of the ſituation of Perth upon it, conclude the city to ſtand amid delightful ſcenery, and to enjoy moſt of the advantages which natural circumſtances afford, for the promotion of trade and induſtry."

Freeſtone, lead, iron, and copper ores, with ſome lapis calaminaris, are found in different parts of Perthſhire. The ſoil, being generally rich and well manured, produces excellent wheat, and all kinds of grain. The hilly country abounds with paſture for the black cattle, horſes, ſheep, goats, and deer. The heaths, woods, and foreſts, are ſtored with variety of game; the rivers teem with ſalmon and trout; the gardens and orchards are ſtored with all kinds of herbs, roots, apples, pears, cherries, plums, and almoſt every ſpecies of fruit found in South Britain. The houſes and attire, even of the commonalty, are neat and decent; and every peaſant can produce a good quantity of linen, and great ſtore of blankets, made in his own family. Indeed, this is the caſe through all the Lowlands of Scotland. Flax is raiſed by every huſbandman; and being dreſſed at home, is ſpun by the females of his family into thread for linen; this is woven by country weavers, of whom there is a great number through all the Low Country, and [illegible] wards bleached or whitened by the good wife and her ſervants; ſo that the whole is made fit for uſe at a very ſmall expence. They likewiſe waſh, card, ſpin, and weave their wool into tartan for plaids, kerties, and coarſe ruſſet-cloth, for common wearing, beſides great part of it which is knit into caps, ſtockings, and mitts. Plaids, made of the fineſt worſted, are worn either plain or variegated, as veils, by women of the lower, and even of the middle rank; nay, ſome years ago, ladies of faſhion wore ſilken plaids with an undreſs: this is a looſe piece of drapery, gathered about the head, ſhoulders, and waiſt, on which it is croſſed, ſo as to leave the hands at liberty, and produces a very good effect to the eye of the ſpectator. The Lowlanders of Perthſhire are civilized, hoſpitable, and induſtrious: the commerce of the country conſiſts chiefly in corn, linen, and black cattle: there are, moreover, ſome merchants who trade to foreign countries.—For an account of the different diviſions of this county above-mentioned, ſee the articles as they occur in the order of the alphabet.

PERTH Proper, ſtretching 20 miles in length, and at ſome places 15 in breadth, is bounded on the north-eaſt, by the Carſe of Gowrie; on the eaſt, by Angus; on the weſt, by Stratherne; on the north, by Athol; and on the ſouth, by the frith of Tay. This is likewiſe a fruitful country, populous and well cultivated, abounding with gentlemen who poſſeſs opulent eſtates; with farmers who underſtand agriculture; and with manufacturers who turn their induſtry to great account. North-eaſtward from Perth to Brechin lies the vale of Strathmore, one of the moſt fertile diſtricts in Scotland, which gives the title of *Earl* to the noble family of Lyon.

The population of this county in 1801 amounted to 126,366 (A).

The following table ſhows the ſtate of the population, according to its pariſhes at two different periods.

	Pariſhes.	Population in 1755.	Population in 1790—1798.
1	Aberdalgy	320	523
	Aberfoil	895	790
	Abernethy	1490	1415
	Abernyte	258	345
5	Alyth	2680	2723
	Arngaſk	736	554
	Auchterarder	1194	1670
	Auchtergaven	1677	1784
	Balquhidder	1592	1300
10	Blackford	1681	1360
	Blair Athol	3257	3120
	Blairgowrie	1596	1651
	Bendothy	1293	878
	Callander	1750	2100
15	Caputh	2048	2045
	Cargill	1697	1720
	Clunie	905	1037
	Collace	499	473
	Comrie	2546	3000
20	Crieff	1414	2640
	Culroſs	1695	1442
	Cupar	1491	2076
	Dron	598	450
	Dull	5748	4676
25	Dunbarnie	764	1250
	Dunblane	2728	2750
	Dunkeld	1298	1773
	Dunkeld, Little	2919	2775
	Dunning	1491	1600
30	Errol	2229	2655
	Forgandenny	1295	978
	Forteviot	1164	970
	Fortingal	3859	3914
	Foſſaway	1765	1505
35	Foulis, Weſter	1716	1224
	Foulis, Eaſter	586	648
	Gaſk	365	486
	Glendovan	220	240
	Inchture	803	1000
40	Kenmore	3067	3463
	Killin	1968	2360
	Kilmadock	2730	3209
	Kilſpindie	828	718
	Kincardine	1250	2068
45	Kinclaven	993	1150
	Kinfauns	639	628
	Kinloch	331	372
	Kinnaird	557	404
	Kinnoul	1163	1465
50	Kirkmichael	2689	2200
	Lecropt	577	420
	Lethendy	346	367
	Logie	1985	1500
	Logierait	2487	2200
55	Longforgan	1285	1526
	Maderty	796	631
	Meigle	1205	1148
	Methven	1790	1786
	Monedie	1402	1320
60	Monivaird	1400	1025
	Monzie	1192	1136
	Moulin	2109	1740
	Muckhart	535	526
	Muthil	2902	2948
65	Perth	9019	19,871
	Port	1865	1765
	Rattray	751	500
	Redgorton	1074	2123
	Rhind	498	495
70	St Madoes	189	300
	St Martins	1083	1090
	Scone	889	1442
	Tippermuir	988	1280
	Trinity Gaſk	913	795
75	Tulliallan	1321	2430
76	Weem	1295	1364
		118,903	133,271
			118,903
		Increaſe,	14,371

PERTH,

(A) It is ſuppoſed that there is ſome error in the ſtatement of the population in 1801, by which it appears to be leſs than in 1790 and 1798. But by the return of the population of the town of Perth, the amount in 1801 is only 14,878; and in 1791 it was nearly 20,000, which will account for the difference.

Perth.

PERTH, the capital of the county of that name, is an agreeable, populous town, situated 20 miles within land, on the south bank of the river Tay. It was otherwise called *St Johnston*, from a church dedicated to St John, as the patron of the place. It is a royal borough, second in dignity to the metropolis, the seat of a large presbytery, and gave the title of *Earl* to the family of Drummond, which is now forfeited. James Drummond, 4th earl, was created duke of Perth by James II. for adhering to whose interests he was outlawed. His two grandsons were attainted in 1745. No less than 14 national councils have been held at Perth between 1201 and 1459. But the oldest was at Scone, A. D. 906. Perth, in the reign of Edward I. of England, was possessed by the English, who secured it with fortifications: but after an obstinate resistance, they were expelled by Robert Bruce. In the year 1715, the rebels made it a place of arms, and retired to it after the battle of Dumblane; but they were in a little time dislodged by the duke of Argyle, and marched northwards with the pretender. They possessed it also in 1745. The pretender was proclaimed here, new magistrates were appointed, and an attempt was made to fortify it. The town is populous and well built: the streets are well paved, and tolerably clean at all times; and the houses, though not stately, make a very decent appearance. Both the streets and houses are, for the greater part, disposed in a regularity of plan, which proves them not to be of the most remote antiquity. It is indeed true, that the level ſituation, being ſingularly favourable to regularity, might, even from the firſt, give this an advantage over many of our old towns. Several ſtreets run in a direction parallel with the river, as far as a right line can bear that relation to a curve line, nearly between eaſt and weſt: these are again intersected by others extending between north and ſouth. It ſhould ſeem that anciently particular ſtreets were inhabited, each by a particular claſs of artiſans. The names ſtill preſerved ſeem to intimate as much. The ſhop-keepers or merchants occupied one ſtreet; the hammermen a ſecond; and other crafts occupied, in the ſame manner, each a ſeparate ſtreet. Many of the houſes in that ſtreet called the *Water-gate*, ſeem to be very old buildings. Towards the ſouth end of the Water-gate ſtands the famous palace of the Gowrie family. The houſe, and the very room, where the attempt of the Gowries to ſeize or aſſaſſinate the king was ſuppoſed to have been made, is now converted into barracks for a train of artillery; but the back-ſtair, down which the dead bodies were thrown, is pulled down. This ſtrange event, however magnified or atteſted by contemporary writers, is made up of ſo many improbabilities, or circumſtances for which no reaſon can be aſſigned, that Sir David Dalrymple, in republiſhing the account printed by authority, 1600, preparatory to his further obſervations on it, ſeems juſtified in abſolutely diſcrediting a fact which paſſed for problematical with ſo many perſons at the very time. Dr Robertſon ſuppoſes it a plot of Elizabeth to get James into her power. Mr Cant having diſcuſſed the whole ſtory of the conſpiracy in his Muſe's Threnodie, p. 185—261, concludes, "that as this would have been a very impolitic meaſure, the beſt way of accounting for it is by James's known hatred to the Puritans, and wiſh to get rid of two popular characters." The king had been ſeized and forced from his favourites by the father of the Ruthvens 12 years before (1582), and though he affected to forgive it, took the firſt opportunity to condemn and execute him as a traitor, 1584. All Scotland [illegible] ſpeak with [illegible] of any part [illegible] nation's [illegible]. Though the name [illegible] was aboliſhed, the title of *Ruthven* was revived in the perſon of Sir Thomas Ruthven of Freeland, whom Charles II. 1651, created Lord Ruthven: but the honour, on the death of his ſon David in 1701, devolved on the only ſurviving daughter of his ſecond ſiſter, who married Sir Francis Ruthven, and was ſucceeded, 1732, by her ſon James.

The caſtle of Perth ſtood near the old bridge, which terminated the narrow ſtreet called *Skinner-gate*. At the end of the [illegible] went to the Black-friars, called [illegible], where the curfeu bell was. The kings of Scotland before James II. were crowned at Scone, and reſided at Perth as the metropolis of the nation. James reſided and was educated in [illegible], and was murdered there 1437. The parliaments [illegible] removed from Perth to Edinburgh, but Perth kept its priority till 22 James III. 1482.

The church in which John Knox harangued is ſtill ſtanding, and is now divided into three; named the *eaſt*, the *middle*, and the *weſt* kirks. The eaſt kirk was lately very handſomely moderniſed within. There is an old hoſpital, a conſiderable building, the founding of which is aſcribed to James VI. The town-houſe ſtands at the eaſtern end of the High-ſtreet. A monaſtery of Carthuſians was here founded by king James I. of Scotland, who loſt his life in the ſame town, by the treachery of Athol and his accomplices. The king was buried in a very ſtately monument in this place, which was called *monaſterium vallis virtutis*, and one of the moſt magnificent buildings in the kingdom, which with the reſt was deſtroyed by the populace. James VI. created George Hay commendator of the Carthuſian priory, giving him all its emoluments, with a vote and ſeat in parliament; but theſe not being ſufficient to ſupport the title, he ſurrendered it back to the king. The only remains of this magnificent ſtructure is to be ſeen in the carved ſtones with which the ſouth-eaſt porch of St John's church is built, now greatly decayed. The king's garment full of ſtabs was preſerved here after the reformation.

The town was anciently provided with a ſtone bridge over the river, which an inundation ſwept away; but a new and very fine one has lately been built, the moſt beautiful ſtructure of the kind in North Britain, and was deſigned and executed by Mr Smeaton. Its length is 900 feet; the breadth (the only blemiſh) 22 within the parapets. The piers are founded 10 feet beneath the bed of the river, upon oaken and beechen piles, and the ſtones laid in puzzolano, and cramped with iron. There are nine arches, of which the centre is 75 feet in diameter. This noble work opens a communication with all the different great roads of the kingdom, and was completed at the expence of 26,000l. Of this the commiſſioners of forfeited eſtates, by his majeſty's permiſſion, gave 11,000l.; Perth 2000l.; [illegible] the royal boroughs 500l. But ſtill this great work would have met with a check for want of money, had not the earl of Kinnoul, with his characteriſtic public ſpirit, advanced the remaining ſum, and taken [illegible] curity of the tolls, with the hazard only to himſelf. The whole expence has now been defrayed, and the toll has ceaſed.

This town has but one pariſh, which has two churches, beſides meetings for ſeparatiſts, who are very numerous. One church, which belonged to a monaſtery, is very ancient: not a veſtige of the laſt is now to be ſeen; for the diſciples of Knox made a general deſolation of every edifice that had given ſhelter to the worſhippers of the church of Rome: it being one of his maxims, to pull down the neſts, and then the rooks would fly away.

The flouriſhing ſtate of Perth is owing to two accidents: the firſt, that of numbers of Cromwell's wounded officers and ſoldiers chooſing to reſide here, after he left the kingdom, who introduced a ſpirit of induſtry among the people; the other cauſe was the long continuance of the earl of Marr's army here in 1715, which occaſioned vaſt ſums of money being ſpent in the place. But this town, as well as all Scotland, dates its proſperity from the year 1745; the government of this part of Great Britain having never been ſettled till a little after that time.

That this town does not owe its origin to William I. 1210, as Boethius ſays, is evident from its being mentioned as a conſiderable place in the foundation charter of Holyrood-houſe by David I. 1128.

The population of Perth in 1791 is ſaid to have been nearly 20,000; but it is ſuppoſed that it has ſince increaſed to 22,000.

The trade of Perth is conſiderable. It exports annually 150,000l. worth of linen, from 24,000 to 30,000 bolls of wheat and barley to London and Edinburgh, and a very large quantity of cured ſalmon. That fiſh is taken there in vaſt abundance; 3000 have been caught in one morning; weighing, one with another, 16 pounds; the whole capture 48,000 pounds. The fiſhery begins on St Andrew's day, and ends Auguſt 26th old ſtyle. The rents of the fiſheries amount to conſiderably upwards of 3000l. per. annum. Smelts come up this river in May and June. W. Long. 3. 27. N. Lat. 56. 22,

Perth Amboy. See *New Jersey*.

PERTINAX, was an illuſtrious Roman emperor after the death of Commodus. He was deſcended of a mean family; and like his father, who was either a ſlave or the ſon of a manumitted ſlave, he for ſome time followed the employment of drying wood and making charcoal. His poverty did not, however, prevent him from receiving a liberal education. For ſome time he was employed in teaching a number of pupils the Greek and the Roman languages in Etruria. He left this laborious profeſſion and became a ſoldier, and by his valour and intrepidity gradually roſe to offices of the higheſt truſt in the army, and was made conſul by M. Aurelius for his ſervices. He was afterwards entruſted with the government of Mœſia, and at length he preſided over the city of Rome as governor. When Commodus was murdered, Pertinax was univerſally choſen to ſucceed to the imperial dignity; and his refuſal, on the plea of old age and increaſing infirmities, did not prevent his being ſaluted emperor and Auguſtus. He complied with reluctance; but his mildneſs, his economy, and popularity, convinced the ſenate and the people of the prudence and the juſtice of their choice. He forbade his name to be inſcribed on ſuch places or eſtates as were part of the imperial domains, and aſſerted that they belonged not to him but to the public. He melted all the ſilver ſtatues which had been raiſed to his predeceſſor, and he expoſed to ſale all his concubines, horſes, arms, and all the inſtruments of his pleaſure and extravagance. With the money raiſed from theſe relics he enriched the empire, and was enabled to aboliſh all the taxes which Commodus had laid on the rivers, ports, and highways, through the empire. Theſe patriotic actions gained him the affection of the wortheiſt and moſt diſcerning of his ſubjects; but the extravagant, luxurious, and vicious, raiſed their clamours againſt him; and when the emperor attempted to introduce among the pretorian guards ſuch diſcipline as was abſolutely neceſſary to preſerve the peace and tranquillity of Rome, the flames of rebellion were kindled, and the minds of the ſoldiers totally alienated. Pertinax was apprized of their mutinying, but he refuſed to fly at the hour of danger. He ſcorned the advice of ſuch of his friends as wiſhed him to withdraw from the impending ſtorm; and he unexpectedly appeared before the ſeditious troops, and without fear or concern boldly aſked them, whether they who were bound by duty to defend the perſon of their prince and emperor, were come to betray him and to ſhed his blood? His undaunted courage and intrepidity would have had the deſired effect, and the ſoldiers had begun to retire, when one of the moſt ſeditious of them advanced and darted his javelin at the emperor's breaſt, exclaiming *The ſoldiers ſend you this*. The reſt inſtantly followed the example; and Pertinax, muffling up his head, and calling upon Jupiter to avenge his death, remained unmoved, and was immediately diſpatched. His head was cut off and carried upon the point of a ſpear in triumph to the camp. This abominable murder happened in the 193d year of the Chriſtian era.

It was no ſooner known that Pertinax had been murdered, than the enraged populace flocked from all quarters of the city; and uttering dreadful menaces againſt the authors of his death, ran up and down the ſtreets in queſt of them. The ſenators were no leſs concerned for his death than the people; the more, becauſe they were now convinced, that the ſoldiers would ſuffer none to reign but tyrants. However, as they had more to loſe than the common people, they did not offer to revenge his death; but either ſhut themſelves up in their own houſes, or in thoſe of the ſoldiers of their acquaintance, thinking themſelves there moſt ſafe. Such was the unfortunate and much-lamented end of Publius Helvius Pertinax, after he had lived 66 years 7 months and 26 or 28 days; and reigned, according to Dio Caſſius, 87 days, that is, from the 1ſt of January to the 28th of March. His body, together with his head, was interred with great pomp by Didius Julianus, his ſucceſſor, in the burying place of his wife's family. The emperor Septimius Severus, with the title of emperor, aſſumed the name of Pertinax, which he knew would above any thing elſe recommend him to the army in Illyricum, and to the Roman people. He puniſhed with great ſeverity all thoſe who had been acceſſary to his death, diſbanded the prætorian guards, honoured his memory with a moſt magnificent funeral, at which was carried the effigies of the deceaſed prince, pronounced his panegyric, and cauſed him to be ranked in the number of the gods, appointing the ſon chief prieſt to his father. The day of his acceſſion to the empire was yearly celebrated with the Circenſian games; and his birthday, for many years after, with other ſports. He performed great things, ſays Herodian, during his ſhort adminiſtration, and would have reſtored the empire to its former luſtre, had he been indulged with a longer reign.

PERTINENT or PARTS, in *Scots Law*. See LAW, Nº clxxii. 6. p. 676.

PERU, a country of South America, is bounded on the north by Popayan, on the eaſt by Amazonia, on the ſouth by Chili, and on the weſt by the Pacific ocean; extending from 1° 40' north to 26° 10' ſouth latitude, and between 56° and 81° weſt longitude from Greenwich; being about 1800 miles in length, but its greateſt breadth does not much exceed 390.

1
How diſcovered by the Spaniards.

This country was diſcovered by the Spaniards; and the firſt intelligence they had of it was on the following occaſion. Nunez de Balboa having been raiſed to the government of the ſmall colony at Santa Maria in Darien by the ſuffrages of his companions, was very deſirous of having that authority confirmed by the court of Spain. For this purpoſe he endeavoured to recommend himſelf to the Spaniſh miniſtry by ſome important ſervice; that is, by extorting from the Indians as much gold and ſilver as he could. He therefore made frequent introads into the adjacent country, ſubdued ſeveral of the caciques or petty princes, and collected a conſiderable quantity of gold. In one of theſe expeditions, the Spaniards contended ſo violently about the diviſion of ſome gold which they had taken, that they were on the point of coming to blows with one another. A young cacique who was preſent, aſtoniſhed at ſuch contention about a thing of which he knew not the uſe, tumbled the gold out of the balance with indignation, and turning to the Spaniards, told them, that ſince they valued gold ſo very highly, he would conduct them to a country where the moſt common utenſils were made of that metal. The Spaniards eagerly catched at this hint; and upon further queſtioning the cacique, were informed, that at the diſtance of ſix days journey, towards the ſouth, from the place where they were at that time, they ſhould diſcover another ocean, near which this deſirable country was ſituated; but if they intended to attack that powerful ſtate, they muſt aſſemble a much greater number of forces than had hitherto appeared on the continent.

Balboa was tranſported at the news. He immediately concluded, that the ocean mentioned by the cacique was that which Columbus had ſo long ſought for in vain, and that the rich country deſcribed to him muſt be part of the Eaſt Indies. He was therefore impatient till he ſhould [illegible] happy country, in compariſon with [illegible] all former exploits almoſt vaniſh[illegible] In order therefore to procure as ſome [illegible] in his enterpriſe, he [illegible] neighbouring caciques, and [illegible] his officers to Hiſpaniola, with [illegible] as a proof of his paſt ſucceſs, and [illegible] expected. By this means he [illegible] the governor, and procured a [illegible]. But though he now [illegible]tly ſtrong to attempt the diſcovery, [illegible] difficulties to be ſurmounted.

2
Difficulties they had to overcome.

[illegible], though not above 60 miles in [illegible] mountains running through [illegible] ſituated between two vaſt oceans, the Atlantic and Pacific, the climate is exceſſively moiſt, inſomuch that it rains for two-thirds of the year. In conſequence of this the valleys are marſhy, and ſo frequently overflowed, that the inhabitants find it neceſſary in ſome places to build their houſes upon trees, in order to be elevated at ſome diſtance from the damp ſoil, and the odious reptiles engendered in the waters. There are alſo many large rivers very difficult to be croſſed; and as the country at that time was only inhabited by a few wandering ſavages, the enterpriſe of Balboa was looked upon as the moſt difficult that had been undertaken by any Spaniſh adventurer.

On this arduous taſk Balboa ſet out on the 1ſt day of September 1513, about the time that the periodical rains began to abate. He had only 190 Spaniards along with him; but all of them were hardy veterans, inured to the climate of America, and very much attached to their leader. A thouſand Indians attended in order to carry their proviſions and other neceſſaries; and they had along with them ſome of thoſe fierce dogs ſo terrible to the natives of America.

Balboa proceeded by ſea, and without difficulty, to the territories of a cacique whoſe friendſhip he had gained; but as ſoon as he began to advance into the interior parts of the country, he met with all the difficulties above-mentioned. Some of the caciques alſo, at his approach, fled with all their people to the mountains, carrying off or deſtroying whatever could afford ſubſiſtence to an army. Others collected their force in order to oppoſe him: however, Balboa continued unmoved in ſpite of all difficulties, and at laſt, after a moſt painful journey of 25 days, he arrived at the South ſea; when, with the moſt extravagant tranſports of joy, he went into it up to the middle, and took poſſeſſion of the ocean in his maſter's name, vowing to defend it againſt all the enemies of Spain.

3
Balboa diſcovers the South Sea.

That part of the South ſea which Balboa now diſcovered, he called the *Gulf of St Michael*; which name it ſtill retains, and is ſituated to the eaſt of Panama. From ſome of the neighbouring caciques he extorted proviſions and gold by force; others ſent him preſents voluntarily; and he had the ſatisfaction to hear, that the adjacent coaſts abounded with pearl-oyſters. The inhabitants were alſo unanimous in declaring, that there was to the ſouthward a very rich and populous country, where the people had tame animals, which they endeavoured to deſcribe to him, meaning the Peruvian ſheep. But, however impatient he might be to viſit this country, he conſidered it as highly improper to venture farther with a handful of men exhauſted by fatigue and diſeaſe. He therefore led back his followers to Santa Maria, in order to refreſh them after their fatigues; and from thence he ſent an account to the court of Spain of the important diſcovery he had made, demanding a reinforcement of 1000 men, in order to conquer the country he had newly diſcovered. But here his hopes were diſappointed at once. The Spaniſh king indeed determined to proſecute the diſcovery, but refuſed to continue Balboa in the government, appointing Pedrarias Davila to ſuperſede him, and giving him the command of 15 ſtout veſſels, with 1200 ſoldiers, to [illegible].

4
[illegible]

Balboa, though much mortified by this diſgrace, ſubmitted to the king's pleaſure without murmuring. It was not long, however, before he met with an [illegible] his misfortune; the new governor tried him for ſome pretended irregularities committed before his arrival, and fined him of almoſt all he was worth. In the mean time the Spaniards, paying no regard to the treaties concluded by Balboa with the Indians, plundered and deſtroyed all indiſcriminately, inſomuch that the whole country, from the gulf of Darien to the lake Nicaragua, was deſolated. The new comers had alſo arrived at the moſt unlucky time of the year, namely, about the middle of the wet ſeaſon, when the exceſſive rains produced the moſt violent and fatal diſeaſes. To this was joined an extreme ſcarcity of proviſions; ſo that in the ſpace of a month above 600 Spaniards periſhed in the utmoſt miſery.

Balboa failed not to ſend violent remonſtrances to Spain againſt the conduct of the new governor; and he, on the other hand, accuſed his antagoniſt of having deceived the king by falſe accounts of the country, and magnifying his own exploits beyond meaſure. At laſt the king, ſenſible of his error in ſuperſeding Balboa, appointed him adelantado, or lieutenant-governor of the countries on the South ſea, with very extenſive privileges and authority; enjoining Pedrarias to ſupport him in all his enterpriſes, and to conſult with him in every thing which he himſelf undertook. It was impoſſible, however, to extinguiſh the envy of Pedrarias; and therefore, though a reconciliation took place in appearance, even ſo far, that Pedrarias agreed to give his daughter in marriage to Balboa, yet he ſoon after had him condemned and executed on pretence of diſloyalty, and an intention to revolt from the king.

5 And put to death.

On the death of Balboa, the thoughts of conquering Peru were for a time laid aſide; however, it ſtill remained an object of deſire to all the Spaniſh adventurers in America. Accordingly, ſeveral armaments were fitted out with a deſign to explore and take poſſeſſion of the countries to the eaſt of Panama; but, either through the difficulties which attended the undertaking itſelf, or the bad conduct of the adventurers, all of them proved unſucceſsful, until at laſt it became a general opinion, that Balboa's ſcheme had been entirely viſionary.

6 A new expedition ſet on foot.

Still, however, there were three perſons ſettled at Panama, on whom the common opinions made ſo little impreſſion, that they determined to go in queſt of this country, looked upon to be chimerical by the generality of their neighbours. Their names were *Franciſco Pizarro*, *Diego de Almagro*, and *Hernando Luque*. Pizarro and Almagro were ſoldiers of fortune, and Luque was an eccleſiaſtic, who acted both as prieſt and ſchoolmaſter at Panama. Their confederacy was authoriſed by Pedrarias governor of Panama; and each engaged to employ his whole fortune in the adventure. Pizarro, being the leaſt wealthy of the three, engaged to take upon himſelf the greateſt ſhare of the fatigue and danger, and to command in perſon the armament which was to go firſt upon the diſcovery. Almagro offered to conduct the ſupplies of proviſions and reinforcements of troops which might be neceſſary; and Luque was to remain at Panama, in order to negociate with the governor, and to ſuperintend whatever was carrying on for the general intereſt.

7 Meets with bad ſucceſs at firſt.

In 1524, Pizarro ſet ſail from Panama with a ſingle veſſel of ſmall burden and 112 men; and ſo little was he or his countrymen at that time acquainted with the climate of America, that the moſt improper ſeaſon of the year was choſen for his departure: the periodical winds, which were then ſet in, being directly oppoſite to the courſe which he propoſed to ſteer. The conſequence of this was, that, after beating about for 70 days with much danger and fatigue, he had advanced ſcarce as far to the ſouth-eaſt as a ſkilful navigator will now make in three days. He touched at ſeveral places of Terra Firma; but finding that country exceedingly inhoſpitable and unhealthy, he was obliged to retire to Chuchama, oppoſite to the Pearl iſlands, where he hoped to receive ſome reinforcements from Panama. Here he was found by Almagro, who had ſet out in queſt of him with a reinforcement of 70 men, and had ſuffered diſtreſſes very much reſembling thoſe of Pizarro himſelf. In particular, he had loſt an eye in combat with the Indians. However, he had advanced as far as the river of St Juan in the province of Popayan, where the country ſhowing a better aſpect, and the inhabitants more friendly, our projectors again began to indulge themſelves in hopes, and determined by no means to abandon their ſcheme.

Almagro returned to Panama, in hopes of recruiting their ſhattered troops. But the bad accounts of the ſervice gave his countrymen ſuch an unfavourable idea of it, that Almagro could levy no more than 80 men, and theſe with great difficulty. Slender as this reinforcement was, however, the adventurers did not heſitate at renewing their enterpriſe. The diſaſters and diſappointments they met with in this new attempt, were ſcarcely inferior to thoſe they had already experienced, when part of the armament at laſt reached the bay of St Matthew on the coaſt of Quito, and landed at Tacamez to the ſouth of the river of Emeralds, where they met with a more fertile and champaign country than any they had yet ſeen; the natives alſo were more civilized, and clothed in garments of cotton or woollen ſtuff, adorned with trinkets of gold and ſilver. But notwithſtanding theſe favourable appearances, Pizarro did not think fit to attack ſuch a powerful empire with an handful of ſoldiers already exhauſted; and therefore retired to a ſmall iſland called Gallo, with part of the troops; from whence he diſpatched Almagro to Panama, in hopes of obtaining a reinforcement.

The reception which Almagro met with was by no means agreeable. Some of the adventurers had informed their friends of the many dangers and loſſes which they had ſuſtained; which not only diſheartened people from engaging in the ſervice, but weighed ſo much with Pedro de los Rios, the ſucceſſor of Pedrarias, that he prohibited the raiſing of new recruits, and even diſpatched a veſſel to bring home Pizarro and his companions from the iſland of Gallo. Almagro and Luque, though much mortified with this diſappointment, privately adviſed Pizarro not to relinquiſh an enterpriſe on which they had built all their hopes. He therefore poſitively refuſed to obey the orders of the governor, and employed all his addreſs in perſuading his men not to abandon him. But the calamities to which they had been expoſed had ſuch an effect upon them, that when he drew a line upon the ſand with his ſword, telling ſuch as wiſhed to return that they might paſs over it, only 13 had reſolution to remain with him.

8 Pizarro abandoned by all his men but thirteen.

Pizarro with his little troop now fixed their reſidence on the iſle of Gorgona, which they conſidered as a ſafer retreat than Gallo, as being farther removed from the coaſt, and uninhabited, ſo that they might with the greater ſecurity wait for ſupplies. Here they continued five months in the moſt unwholeſome climate imaginable, and at laſt had come to a reſolution of committing themſelves to ſea on a float, when a veſſel arrived from Panama to their relief. This was the effect of the continued ſolicitations of Almagro and Luque; who, though they could not prevail upon the governor to favour the undertaking, had ſucceeded ſo far as to induce him to ſend a ſmall veſſel to the relief of Pizarro and his unfortunate aſſociates. However, the more effectually to ſhow his diſapprobation of Pizarro's ſcheme, the governor refuſed to allow one landman to go on board of the ſhip which he ſent.—The hopes of the adventurers were now again revived, and Pizarro eaſily induced them to reſume their ſcheme. Inſtead of returning to Panama, therefore, they ſailed to the ſouth-eaſt, and in 20 days after the diſcovery of Gorgona, they diſcovered the coaſt of Peru. Having touched at ſome places of leſs note, they at length arrived at Tumbez, remarkable for its ſtately temple, and a palace of the incas or ſovereigns of the country. Here they found that what had been told them concerning the riches of the country was true; not only ornaments and ſacred veſſels being made of gold and ſilver, but even ſuch as were for common uſe. Yet to attempt the conqueſt of this opulent empire with their ſlender force, would have been madneſs; they contented themſelves therefore with viewing it, procuring two of the beaſts of burthen called *llamas*, to which they gave the name of ſheep, ſome veſſels of gold and ſilver, and two young men, whom they propoſed to inſtruct in the Caſtilian language. With theſe Pizarro arrived at Panama in the year 1527, near three years after he had ſet out from that place on his expedition.

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10
Hiſtory of
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The empire of Peru, thus diſcovered, is ſaid to have been originally poſſeſſed by independent tribes, juſtly reckoned among the moſt ſavage even in America; living more like wild beaſts than men. For ſeveral ages they lived in this manner, when ſuddenly there appeared on the banks of a lake called *Titiaca*, a man and woman of majeſtic form, and clothed in decent garments. They declared themſelves to be the children of the ſun, ſent by their beneficent parent to inſtruct and reclaim mankind.

The names of theſe two extraordinary perſonages were *Manco Capac* and *Mama Ocla.* At their perſuaſion, ſeveral of the diſperſed ſavages united, and, receiving their commands as heavenly injunctions, followed them to Cuzco, where they ſettled, and began to lay the foundations of a city. Manco Capac inſtructed the men in agriculture, and other uſeful arts; while Mama Ocla taught the women to ſpin and weave; after which Manco turned his attention towards the introduction of proper laws and regulations into his new ſtate.

Thus, according to the Indian tradition, was founded the empire of the Incas, or lords of Peru. At firſt its extent was ſmall, the territory of Manco Capac reaching not above eight leagues from Cuzco his capital. Within theſe narrow limits, however, he exerciſed the moſt perfect deſpotiſm, and the ſame was maintained by his ſucceſſors, all of whom were not only obeyed as monarchs, but reverenced as deities. Their blood was held to be ſacred, and, by prohibiting intermarriages with the people, was never contaminated by mixing with that of any other race. The family, thus ſeparated from the reſt of the nation, was diſtinguiſhed by peculiarities in dreſs and ornaments, which it was unlawful for others to aſſume. Among the Peruvians, however, it is ſaid, that this high degree of veneration was made uſe of by the monarchs only to promote the good of their ſubjects. If we may believe the accounts given by their countrymen, the Peruvian monarchs extended their empire not with a view to increaſe their own power and wealth, but from a deſire of diffuſing the bleſſings of civilization, and the knowledge of the arts which they poſſeſſed, among the barbarous people whom they reduced, and, during a ſucceſſion of 12 monarchs, not one deviated from this character.

Carver's Modern General Traveller.

11
Religion of the Peruvians.

The Peruvians were taught by Manco to adore the Creator of heaven and earth, whom they denominated *Paca Camac*, that intelligence which animated the world. They ſeldom built temples or offered ſacrifices to him, but worſhipped him in their hearts. One temple, however, dedicated to *The unknown God*, the Spaniards found at their arrival, erected in a valley, thence named *the valley of Paca Camac*. The ſacrifices inſtituted in honour of the ſun conſiſted chiefly of lambs; beſides which they offered all ſorts of cattle, fowls, and corn, and even burnt their fineſt cloths on the altar by way of incenſe. They had alſo drink offerings made of maize or Indian corn, ſteeped in water. Nor were thoſe oblations the only acts of adoration in general uſe among them. When they firſt drank after their meals, they dipped the tip of their finger into the cup, and lifting up their eyes with great devotion, gave the ſun thanks for their liquor, before they preſumed to take a draught of it.

Beſides the worſhip of the ſun, they paid ſome kind of veneration to the images of ſeveral animals and vegetables that had a place in their temples. Theſe were generally the images brought from the conquered nations, where the people worſhipped all ſorts of creatures, animate or inanimate; it being the cuſtom, when a province was ſubdued, to remove all their idols to the temple of the ſun at Cuzco.

Excluſive of the ſolemnities at every full moon, four grand feſtivals were celebrated annually. The firſt of thoſe, called *Raymi*, was held in the month of June, immediately after the ſummer ſolſtice, and was kept not only in honour of the ſun, but of their firſt Inca, Manco Capac, and Coya Mama Ocla, his wife and ſiſter, whom the Incas conſidered as their firſt parents, deſcended immediately from the ſun, and ſent by him into the world to reform and poliſh mankind. At this feſtival, all the viceroys, generals, governors, and nobility, were aſſembled at the capital city of Cuzco; and the emperor, or Inca, officiated in perſon as high-prieſt; though on other occaſions the ſacerdotal function was diſcharged by the regular pontiff, who was uſually either the uncle or brother of the Inca.

The morning of the feſtival being come, the Inca, accompanied by his near relations, drawn up in order according to their ſeniority, went barefoot in proceſſion, at break of day, to the market-place, where they remained looking attentively towards the eaſt in expectation of the riſing ſun. The luminary no ſooner appeared, than they fell proſtrate on their faces in the moſt profound veneration, and univerſally acknowledged it to be their god and father.

The vaſſal princes, and nobility, that were not of the blood royal, aſſembled in another ſquare, and performed the like ceremony. Out of a large flock of ſheep the prieſts then choſe a black lamb, which they offered in ſacrifice, firſt turning its head towards the eaſt. From the entrails of the victim, on this occaſion, they ſuperſtitiouſly drew prognoſtics relating to peace and war, and other public events.

That the Peruvians believed in the immortality of the ſoul, appears from the practice of the Incas, who conſtantly inculcated to the people, that, on leaving this world, they ſhould enter into a ſtate of happineſs provided for them by their god and father the ſun.

12 They were acquainted with aſtronomy before the arrival of the Spaniards.

Before the arrival of the Spaniards in America, the Peruvians were acquainted with ſome points of aſtronomy. They had obſerved the various motions of the planet Venus, and the different phaſes of the moon. The common people divided the year only by the ſeaſons; but the Incas, who had diſcovered the annual revolution of the ſun, marked out the ſummer and winter ſolſtices by high towers, which they erected on the eaſt and weſt of the city of Cuzco. When the ſun came to riſe directly oppoſite to four of thoſe towers, on the eaſt ſide of the city, and to ſet againſt thoſe of the weſt, it was then the ſummer ſolſtice; and in like manner, when it roſe and ſet againſt the other towers, it was the winter ſolſtice. They had alſo erected marble pillars in the great court before the temple of the ſun, by which they obſerved the equinoxes. This obſervation was made under the equator, when the ſun being directly vertical, the pillars caſt no ſhade. At thoſe times they crowned the pillars with garlands of flowers and odoriferous herbs, and celebrating a feſtival, offered to their adored luminary rich preſents of gold and precious ſtones.

They diſtinguiſhed the months by the moon, and their weeks were called quarters of the moon; but the days of the week they marked only by the ordinal numbers, as firſt, ſecond, &c. They were aſtoniſhed at the eclipſes of the ſun and moon. When the former hid his face, they concluded it was on account of their ſins, imagining that this phenomenon portended famine, war, and peſtilence, or ſome other terrible calamity. In a ſimilar ſtate of the moon, they apprehended that ſhe was ſick, and when totally obſcured, that ſhe was dying. At this alarming criſis they ſounded their trumpets, and endeavoured by every kind of noiſe to rouſe the lunar planet from her ſuppoſed lethargy; teaching their children to cry out, and call upon *mama quilla*, or "mother moon," that ſhe would not die and leave them to periſh.

They made no predictions from any of the ſtars, but conſidered dreams, and the entrails of beaſts which they offered in ſacrifice, as inſtructive objects of divination. When they ſaw the ſun ſet, they imagined that he plunged into the ocean, to appear next morning in the eaſt.

13 They had teachers of morality;

Among a people wholly void of letters, the ſpeculative eſſays of the underſtanding muſt have been very rude and imperfect. They had, however, among them amentas, or philoſophers, who delivered moral precepts, and likewiſe cultivated poetry. Comedies and tragedies compoſed by thoſe bards were acted on their feſtivals before the king and the royal family, the performers being the great men of the court, and the principal officers of the army. The amentas alſo compoſed ſongs and ballads; but if we may judge from the rudeneſs of the muſic with which they are ſaid to have been accompanied, they were far from being agreeable to a poliſhed ear.

14 And were not unacquainted with painting and ſtatuary.

That the Peruvians were not unacquainted with painting and ſtatuary, appears from the furniture and ornaments of their temples and palaces; but in all the implements of mechanic arts they were extremely deficient. Though many goldſmiths were conſtantly employed, they had never invented an anvil of any metal, but in its ſtead made uſe of a hard ſtone. They beat their plate with round pieces of copper in place of hammers; neither had they any files or graving tools. Inſtead of bellows for melting their metals, they uſed copper pipes, of a yard long, almoſt of the form of a trumpet. Having no tongs to take their heated metal out of the fire, they made uſe of a ſtick or copper bar. Their carpenters had no other tools than hatchets made of copper or flint; nor had they learned the uſe of iron; though the country affords mines of that metal. Inſtead of nails, they faſtened their timber with cords or the tough twigs of trees. A thorn, or a ſmall bone, ſerved them for a needle; and inſtead of thread, the ſinews of animals, or the fibres of ſome plant. Their knives were made of flint or copper.

15 Progreſs of the Spaniards facilitated by a civil war among the natives;

When the Spaniards firſt viſited this country, they found it agitated by a civil war. Huana Capac, the 12th monarch from the founder of the ſtate, was ſeated on the throne; who is repreſented as a prince no leſs conſpicuous for his abilities in war than for his pacific virtues. By him the kingdom of Quito was ſubdued, which almoſt doubled the extent of the dominions and power of the Peruvian empire. Notwithſtanding the ancient and fundamental law againſt polluting the blood of the Inca with any foreign alliance, Huana married the daughter of the conquered monarch, by whom he had a ſon named *Atahualpa*, commonly written *Atabalipa*, to whom, at his death in 1529, he left the kingdom of Quito, beſtowing the reſt of his dominions upon Huaſcar his eldeſt ſon by a mother of the royal race. This produced a civil war, in which Atabalipa proved victorious, and afterwards attempted to ſecure himſelf on the throne by putting to death all the deſcendants of Manco Capac, ſtyled *the children of the ſun*, whom he could ſeize either by force or ſtratagem; however, from a political motive, he ſpared the life of his rival Huaſcar, who had the misfortune to be taken priſoner in an engagement, that, by iſſuing out orders in his name, he might more eaſily eſtabliſh his own authority, and cover the illegality of his birth.

This conteſt had ſo much engaged the attention of the Peruvians, that they never once attempted to check the progreſs of the Spaniards. It was ſome time, however, before Pizarro was informed of this conteſt, ſo much in his favour. The firſt intelligence which he received of it was a meſſage from Huaſcar, aſking his aſſiſtance againſt Atabalipa, whom he repreſented as a rebel and an uſurper. Pizarro perceived the importance of the intelligence, and therefore determined to puſh forward, while inteſtine diſcord put it out of the power of the Peruvians to attack him with their whole force. Being obliged to divide his troops, in order to leave a garriſon in St Michael, which might ſerve for a place of retreat in caſe of a diſaſter, he began his march with only 62 horſemen and 102 foot-ſoldiers, 20 of whom were armed with croſs-bows, and only three with muſkets. He directed his courſe towards Caxamalca, a ſmall town at the diſtance of 12 days march from St Michael, where Atabalipa was encamped with a conſiderable body of troops. Before he had proceeded far, an officer diſpatched by the Inca met him with a valuable preſent from that prince, accompanied with a proffer of his alliance, and his aſſurances of a friendly reception at Caxamalca. Pizarro, according to the uſual artifice of his countrymen in America, pretended to come as the ambaſſador of a powerful monarch, and declared that he was now advancing with intention to offer Atabalipa his aid againſt thoſe enemies who diſputed his title to the throne.

16
And by their ignorance of the motives of the Spaniards.

As the object of the Spaniards in entering their country was altogether incomprehenſible to the Peruvians, they had formed various conjectures concerning it, without being able to decide whether they ſhould conſider their new gueſts as beings of a ſuperior nature, who had viſited them from ſome beneficent motive, or as formidable avengers of their crimes, and enemies to their repoſe and liberty. The continual profeſſions of the Spaniards, that they came to enlighten them with the knowledge of truth, and lead them in a way of happineſs, favoured the former opinion; the outrages which they committed, their rapaciousneſs and cruelty, were awful confirmations of the latter. While in this ſtate of uncertainty, Pizarro's declaration of his pacific intentions ſo far removed all the Inca's fears, that he determined to give him a friendly reception. In conſequence of this reſolution, the Spaniards were allowed to march in tranquillity acroſs the ſandy deſert between St Michael and Motupè, where the moſt feeble effort of an enemy, added to the unavoidable diſtreſſes which they ſuffered in paſſing through that comfortleſs region, muſt have proved fatal to them. From Motupè they advanced towards the mountains which encompaſs the low country of Peru, and paſſed through a defile ſo narrow and inacceſſible, that a few men might have defended it againſt a numerous army. But here likewiſe, from the ſame inconſiderate credulity of the Inca, the Spaniards met with no oppoſition, and took quiet poſſeſſion of a fort erected for the ſecurity of that important ſtation. As they now approached near to Caxamalca, Atabalipa renewed his profeſſions of friendſhip; and, as an evidence of his ſincerity, ſent them preſents of greater value than the former.

On entering Caxamalca, Pizarro took poſſeſſion of a large court, on one ſide of which was a houſe which the Spaniſh hiſtorians call a palace of the Inca, and on the other a temple of the ſun, the whole ſurrounded with a ſtrong rampart or wall of earth. When he had poſted his troops in this advantageous ſtation, he diſpatched Hernando Soto, and his brother Ferdinand, to the camp of Atabalipa, which was about a league diſtant from the town. He inſtructed them to confirm the declaration which he had formerly made of his pacific diſpoſition, and to deſire an interview with the Inca, that he might explain more fully the intention of the Spaniards in viſiting his country. They were treated with all the reſpectful hoſpitality uſual among the Peruvians in the reception of their moſt cordial friends, and Atabalipa promiſed to viſit the Spaniſh commander next day in his quarters. The decent deportment of the Peruvian monarch, the order of his court, and the reverence with which his ſubjects approached his perſon and obeyed his commands, aſtoniſhed thoſe Spaniards, who had never met in America with any thing more dignified than the petty cacique of a barbarous tribe. But their eyes were ſtill more powerfully attracted by the vaſt profuſion of wealth which they obſerved in the Inca's camp. The rich ornaments worn by him and his attendants, the veſſels of gold and ſilver in which the repaſt offered to them was ſerved up, the multitude of utenſils of every kind formed of thoſe precious metals, opened proſpects far exceeding any idea of opulence that a European of the 16th century could form.

On their return to Caxamalca, while their minds were yet warm with admiration and deſire of the wealth which they had beheld, they gave ſuch a deſcription of it to their countrymen, as confirmed Pizarro in a reſolution which he had already taken. From his own obſervation of American manners during his long ſervice in the New World, as well as from the advantages which Cortes had derived from ſeizing Montezuma, he knew of what conſequence it was to have the Inca in his power.

17
Perfidious ſcheme of Pizarro to ſeize the Inca.

For this purpoſe, he formed a plan as daring as it was perfidious. Notwithſtanding the character he had aſſumed of an ambaſſador from a powerful monarch, who courted an alliance with the Inca, and in violation of the repeated offers which he had made to him of his own friendſhip and aſſiſtance, he determined to avail himſelf of the unſuſpicious ſimplicity with which Atabalipa relied on his profeſſions, and to ſeize his perſon during the interview to which he had invited him. He prepared for the execution of his ſcheme with the ſame deliberate arrangement, and with as little compunction, as if it had reflected no diſgrace on himſelf or his country. He divided his cavalry into three ſmall ſquadrons, under the command of his brothers Ferdinand, Soto, and Benalcazar; his infantry was formed into one body, except 20 of moſt tried courage, whom he kept near his own perſon to ſupport him in the dangerous ſervice which he reſerved for himſelf; the artillery, conſiſting of two field-pieces, and the croſs-bow men, were placed oppoſite to the avenue by which Atabalipa was to approach. All were commanded to keep within the ſquare, and not to move until the ſignal for action was given.

Early in the morning the Peruvian camp was all in motion. But as Atabalipa was ſolicitous to appear with the greateſt ſplendour and magnificence in his firſt interview with the ſtrangers, the preparations for this were ſo tedious, that the day was far advanced before he began his march. Even then, leſt the order of the proceſſion ſhould be deranged, he moved ſo ſlowly, that the Spaniards became impatient and apprehenſive that ſome ſuſpicion of their intention might be the cauſe of this delay. In order to remove this, Pizarro diſpatched one of his officers with freſh aſſurances of his friendly diſpoſition. At length the Inca approached. Firſt of all appeared

400 men in an uniform dreſs, as harbingers to clear the way before him. He himſelf, ſitting on a throne or couch, adorned with plumes of various colours, and almoſt covered with plates of gold and ſilver enriched with precious ſtones, was carried on the ſhoulders of his principal attendants. Behind him came ſome chief officers of his court carried in the ſame manner. Several bands of ſingers and dancers accompanied this cavalcade; and the whole plain was covered with troops, amounting to more than 30,000 men.

As the Inca drew near the Spaniſh quarters, Father Vincent Valverede, chaplain to the expedition, advanced with a crucifix in one hand, and a breviary in the other, and in a long diſcourſe explained to him the doctrine of the creation, the fall of Adam, the incarnation, the ſufferings and reſurrection of Jeſus Chriſt, the appointment of St Peter as God's vicegerent on earth, the tranſmiſſion of his apoſtolical power by ſucceſſion to the popes, the donation made to the king of Caſtile by Pope Alexander of all the regions in the New World. In conſequence of all this, he required Atabalipa to embrace the Chriſtian faith, to acknowledge the ſupreme juriſdiction of the pope, and to ſubmit to the king of Caſtile as his lawful ſovereign; promiſing, if he complied inſtantly with this requiſition, that the Caſtilian monarch would protect his dominions, and permit him to continue in the exerciſe of his royal authority; but if he ſhould impiouſly refuſe to obey his ſummons, he denounced war againſt him in his maſter's name, and threatened him with the moſt dreadful effects of his vengeance.

This ſtrange harangue, unfolding deep myſteries, and alluding to unknown facts, of which no power of eloquence could have conveyed at once a diſtinct idea to an American, was ſo lamely tranſlated by an unſkilful interpreter, little acquainted with the idiom of the Spaniſh tongue, and incapable of expreſſing himſelf with propriety in the language of the Inca, that its general tenor was altogether incomprehenſible to Atabalipa. Some parts in it, of more obvious meaning, filled him with aſtoniſhment and indignation. His reply, however, was temperate. He began with obſerving, that he was lord of the dominions over which he reigned by hereditary ſucceſſion; and added, that he could not conceive how a foreign prieſt ſhould pretend to diſpoſe of territories which did not belong to him; that if ſuch a prepoſterous grant had been made, he, who was the rightful poſſeſſor, refuſed to confirm it; that he had no inclination to renounce the religious inſtitutions eſtabliſhed by his anceſtors; nor would he forſake the ſervice of the ſun, the immortal divinity whom he and his people revered, in order to worſhip the God of the Spaniards, who was ſubject to death; that with reſpect to other matters contained in his diſcourſe, as he had never heard of them before, and did not now underſtand their meaning, he deſired to know where he had learned things ſo extraordinary. "In this book," anſwered Valverede, reaching out to him his breviary. The Inca opened it eagerly; and turning over the leaves, lifted it to his ear: "This (ſays he) is ſilent; it tells me nothing;" and threw it with diſdain to the ground. The enraged monk, running towards his countrymen, cried out, "To arms, Chriſtians, to arms; the word of God is inſulted; avenge this profanation on thoſe impious dogs."

Pizzaro, who during this long conference had with difficulty reſtrained his ſoldiers, eager to ſeize the rich ſpoils of which they had now ſo near a view, immediately gave the ſignal of aſſault. At once the martial muſic ſtruck up, the cannon and muſkets began to fire, the horſe ſallied out fiercely to the charge, the infantry ruſhed on ſword in hand. The Peruvians, aſtoniſhed at the ſuddenneſs of an attack which they did not expect, and diſmayed with the deſtructive effects of the fire-arms, and the irreſiſtible impreſſion of the cavalry, fled with univerſal conſternation on every ſide, without attempting either to annoy the enemy or to defend themſelves. Pizarro, at the head of his choſen band, advanced directly towards the Inca; and though his nobles crowded around him with officious zeal, and fell in numbers at his feet, while they vied one with another in ſacrificing their own lives, that they might cover the ſacred perſon of their ſovereign, the Spaniards ſoon penetrated to the royal ſeat; and Pizarro ſeizing the Inca by the arm, dragged him to the ground, and carried him as a priſoner to his quarters. The fate of the monarch increaſed the precipitate flight of his followers. The Spaniards purſued them towards every quarter, and, with deliberate and unrelenting barbarity, continued to ſlaughter wretched fugitives, who never once offered at reſiſtance. The carnage did not ceaſe until the cloſe of day. Above 4000 Peruvians were killed. Not a ſingle Spaniard fell, nor was one wounded but Pizarro himſelf, whoſe hand was ſlightly hurt by one of his own ſoldiers, while ſtruggling eagerly to lay hold on the Inca.

18
Atabalipa ſeized by Pizarro.

19
He offers an immenſe ſum for his liberty.

The plunder taken on this occaſion was immenſe, but the Spaniards were ſtill unſatisfied; which being obſerved by the Inca, he endeavoured to apply himſelf to their ruling paſſion, avarice, in order to obtain his liberty: and therefore offered ſuch a ranſom as aſtoniſhed them, even after all they knew concerning the opulence of the country. The apartment in which he was confined was 22 feet in length and 16 in breadth; and all this ſpace he engaged to fill with veſſels of gold as high as he could reach. This propoſal was eagerly caught by Pizarro, and a line was drawn upon the walls to mark the ſtipulated height.

Atabalipa, charmed with the thoughts of liberty, immediately ſet about performing his part of the agreement, and diſpatched meſſengers into all parts of the empire, in order to collect the immenſe quantity of gold which he had promiſed; and though the unfortunate monarch was now in the hands of his enemies, ſuch was the veneration which his ſubjects had for him, that his orders were obeyed with as great alacrity as though he had been at full liberty; while he, in the mean time, flattering himſelf with the hopes of being ſoon releaſed, made no preparations for expelling the invaders from his dominions.

In a ſhort time Pizarro received intelligence that Almagro was arrived at St Michael with a reinforcement equal to the force he had with him. This was a matter of great joy to the Spaniards, and no ſmall vexation to Atabalipa, who now conſidered his kingdom as in danger of being totally overrun by theſe ſtrangers, whoſe force he neither knew, nor the means they had of tranſporting themſelves. For this reaſon he determined to put his brother Huaſcar to death, leſt he ſhould join the ſtrangers againſt him. To this he was the rather inclined,

clined, as he had got information that the captive prince had been making applications to them, and had offered them a much larger ſum than what was ſtipulated for the Inca's ranſom; and in conſequence of this determination the unfortunate prince loſt his life.

In the mean time the Indians daily arrived at Caxamalca with vaſt quantities of treaſure; the ſight of which ſo much inflamed the Spaniards, that they inſiſted upon an immediate diviſion: and this being complied with, there fell to the ſhare of each horſeman 8000 peſos, at that time not inferior to the value of as many pounds ſterling in the preſent century, and half as much to each foot ſoldier, Pizarro and his officers receiving ſhares proportionable to their dignity. A fifth part was reſerved for the emperor, together with ſome veſſels of curious workmanſhip as a preſent. In conſequence of this immenſe acquiſition of wealth, many of the Spaniards became clamorous for their diſcharge; which was readily granted by their general, as well knowing that the diſplay of their riches would not fail to allure adventurers more hardy, though leſs opulent, to his ſtandard.

20 izarro re- ives to ıt the ca to eath.

After this diviſion of the ſpoil, Atabalipa was very importunate with Pizarro in order to recover his liberty; but the Spaniard, with unparalleled treachery and cruelty, had now determined to put him to death. To this he was urged by Almagro's ſoldiers, who, though they had received an equal ſhare with the reſt, were ſtill unſatisfied. The Inca's ranſom had not been completed; and they were apprehenſive, that whatever ſums might afterwards be brought in, the troops of Pizarro would appropriate them to themſelves as part of that ranſom. They inſiſted with Pizarro, therefore, to put him to death, that all the adventurers might for the future be on an equal footing. Accounts were likewiſe received that troops were aſſembling in the remote provinces of the empire, which Pizarro ſuſpected to be done by the Inca's orders. Theſe accounts were heightened by one Philipillo an Indian interpreter, who had conceived a paſſion for one of the unhappy monarch's wives; and for that reaſon wiſhed to have him put to death. Atabalipa himſelf, too, had the misfortune to haſten his own ruin by his conceiving a contemptuous notion of Pizarro, which he had not the precaution to conceal. He had, ſince they were firſt diſcovered by him, admired the European arts of reading and writing, and wiſhed much to know whether he ſhould regard it as a natural or acquired talent. In order to determine this, he deſired one of the ſoldiers who guarded him to write the name of God upon the nail of his thumb. This he ſhowed to ſeveral Spaniards ſucceſſively, aſking its meaning; and to his ſurpriſe, they all returned the ſame anſwer. At length Pizarro entered; and, on preſenting it to him, he bluſhed, and was obliged to own his ignorance; which inſpired the Inca with the contemptuous notion of him above-mentioned.

21 abalipa ufed and demn-

In order, however, to give ſome ſhow of juſtice to ſuch a deteſtable action, and that he might be exempted from ſtanding ſingly as the perpetrator, Pizarro reſolved to accuſe the Inca of ſome capital crime, and inſtitute a court of judicature for the purpoſe of trying him. For this purpoſe, he appointed himſelf and Almagro, with two aſſiſtants, as judges, with full powers to acquit or condemn: an attorney-general was named to carry on the proſecution in the king's name; counſellors were choſen to aſſiſt the priſoner in his defence; and clerks were ordained to record the proceedings of court. Before this ſtrange tribunal a charge was exhibited ſtill more amazing. It conſiſted of various articles: that Atabalipa, though a baſtard, had diſpoſſeſſed the lawful owner of the throne, and uſurped the regal power; that he had put his brother and lawful ſovereign to death; that he was an idolater, and had not only permitted, but commanded the offering up of human ſacrifices; that he had a great number of concubines; that ſince his impriſonment, he had waſted and embezzled the royal treaſures, which now belonged of right to the conquerors; and that he had excited his ſubjects to take up arms againſt the Spaniards. On theſe heads of accuſation they proceeded to try the ſovereign of a great empire, over whom they had no juriſdiction. To all theſe charges the Inca pleaded not guilty. With reſpect to the death of his brother, he alleged, that the Spaniards could take no cognizance of the fact. With regard to the taxes which he had levied, and the wars he had carried on, they were nothing to the Spaniards; and as to the conſpiracy againſt the Spaniards, he utterly denied it. He called heaven and earth to witneſs the integrity of his conduct, and how faithfully he had performed his engagements, and the perfidy of his accuſers. He deſired to be ſent over to Spain to take his trial before the emperor; but no regard was paid to his intreaties. He was condemned to be burnt alive; which cruel ſentence was mitigated, as a great favour, to ſtrangling; and the unhappy monarch was executed without mercy.

22 and ſtrangled.

23 A general revolt of the Peruvians.

The death of the Inca was followed by a revolution in the Spaniſh affairs, who now became generally odious. Hideous cries were ſet up by his women as the funeral proceſſion paſſed by their apartment; many offered to bury themſelves alive with him; and on being hindered, ſtrangled themſelves out of grief and vexation. The whole town of Caxamalca was filled with lamentation, which quickly extended itſelf over the whole kingdom. Friends and enemies accuſed the Spaniards of inhumanity and treachery. Loads of gold that were coming to Caxamalca by order of the deceaſed Inca were now ſtopped; and the loſs of the treaſure was the firſt unfortunate conſequence which the Spaniards felt from their late iniquitous conduct. The two factions of Indians united againſt Pizarro; and many of the Spaniards not only exclaimed againſt the cruelty of the judges, but would even have mutinied, had not a ſenſe of the impending danger kept them quiet. At Cuzco the friends of the emperor Huaſcar proclaimed Manco Capac the legitimate brother of the late Inca, determining to ſupport him to the laſt againſt all the machinations of his enemies. Pizarro, in the mean time, ſet up Taparpa, the ſon of Atabalipa, cauſing him to be treated with all the honours due to an emperor. Immediately he ſet out for Cuzco, the gaining of which was abſolutely neceſſary for his deſign. An army of Indians occupied the paſſes, and reſolved to diſpute his progreſs. The conteſt, however, was ſoon decided; the Spaniſh cavalry bore down every thing before them, and great numbers of Indians were ſlain. The conquerors gained a conſiderable booty; and Pizarro diſpatched Almagro to reduce Cuzco, while he himſelf founded a new colony in the fruitful valley of Xauna; which, however, was not permanent being afterwards removed to the place where Lima now ſtands.

While Pizarro was thus employed, another commander, named *Ferdinando Soto*, was detached with 60 horſe to make the beſt of his way to Cuzco, and clear the road for the march of the remainder of the army. He was oppoſed by a formidable collection of Indians, who had fortified themſelves in order to defend a paſs againſt him: for which reaſon, fearing leſt his ſtrength might be unequal, he ſent a meſſage to Pizarro, deſiring that the Inca might join him, thinking that his preſence would awe the Peruvians, and prevent the further effuſion of blood: but his expectations were fruſtrated by the death of the Inca, which happened about this time; ſo that there was now a neceſſity for having recourſe to arms; for as the Spaniards ſet up no perſon in his room, the title of Manco Capac was univerſally acknowledged.

In the mean time, a new ſupply of ſoldiers arriving from Spain, Benalcazar, governor of St Michael, undertook an expedition againſt Quito, where, according to the report of the natives, Atabalipa had left the greateſt part of his treaſure. He accompliſhed his purpoſe with very great difficulty, having a country covered with rocks and mountains to paſs, and being oppoſed by large bodies of the natives. But when he got poſſeſſion of the city, to his extreme mortification, he found that the inhabitants had carried off all their gold and ſilver; for they being now acquainted with the ruling paſſion of the Spaniards, had taken care to diſappoint it, by removing the treaſures which they knew very well had been the cauſe of the expedition.

24
Chili invaded by Alvarado.

About the ſame time Alvarado governor of Guatimala, invaded the province of Chili. In this expedition his troops endured ſuch hardſhips, and ſuffered ſo much from the cold among the Andes, that a fifth part of the men and all the horſes died, and at the ſame time the reſt were ſo much diſpirited and emaciated, that they became quite unfit for ſervice. What was worſt of all, when they had arrived at the end of their journey, they met with a body of Spaniards drawn up in hoſtile array to oppoſe them. Theſe had been ſent againſt him by Pizarro, who claimed Chili as part of his juriſdiction, and were now joined by Benalcazar, with the troops under his command. Alvarado, however, advanced boldly to the attack; but on the interpoſition of ſome moderate men in each party, the difference was accommodated. Alvarado engaged to return to his government, upon his being paid 100,000 peſos to defray the expence of his armament. However, moſt of his followers remained in the country, and enliſted in the ſervice of Pizarro.

25
He is obliged by Pizarro to abandon the enterprize.

26
Honours conferred on Pizarro by the court of Spain.

In the mean time Ferdinand Pizarro, the brother of the general, had landed in Spain, where he produced ſuch immenſe quantities of gold and ſilver as aſtoniſhed the court, even after all they had ſeen of the wealth of their new diſcovered territories. The general's authority was confirmed to him, with new powers and privileges, and the addition of 70 leagues extending along the coaſt, to the ſouthward of the territory granted in his former patent. Almagro had the title of *adelantado* or *governor* conferred upon him, with juriſdiction over 200 leagues of a country lying ſouthward from the province alloted to Pizarro; he himſelf was made a knight of the order of St Jago.

Of theſe tranſactions ſome accounts were received at Peru before the arrival of Ferdinand Pizarro himſelf; and no ſooner did Almagro hear that he had obtained the royal grant of an independent government, than, pretending that Cuzco, the capital of all Peru, lay within his juriſdiction, he attempted to ſeize it. Pizarro was no leſs ready to oppoſe him; and a very dangerous civil war was about to take place, when the quarrel was made up, on condition that Almagro ſhould attempt the conqueſt of Chili; and if he did not find there an eſtabliſhment equivalent to his expectations, Pizarro ſhould yield up to him part of Peru.

By this reconciliation Pizarro was left at liberty to ſettle the internal policy of his province, which, though little qualified for a legiſlator, he attempted, by dividing the country into various diſtricts, appointing magiſtrates to preſide in each, and eſtabliſhing ſuch regulations concerning the adminiſtration of juſtice, the royal revenue, &c. as occurred to him. The ſeat of government he removed from Cuzco to Lima, which he named *Ceudad des los Reyes*, and which name it ſtill retains among the Spaniards in all legal and formal deeds. Its other name, *Lima*, is a corruption of *Rimac*, the name of the valley in which the city ſtands.

27
A dreadful inſurrection of the Peruvians.

In the mean time Almagro had ſet out on his expedition to Chili; the event of which has been related under the article CHILI; and while he was thus employed, Pizarro encouraged ſome of his moſt diſtinguiſhed officers to invade thoſe provinces of the empire which had not yet been viſited by the Spaniards. This he did with a view to keep them employed, and prevent tumults; but it was attended with very terrible conſequences. No ſooner did Manco Capac the Inca perceive the ſecurity of the Spaniards in thus dividing their forces, than he ſeized the opportunity of making one vigorous effort to redreſs the wrongs of himſelf and his countrymen, and expel the invaders, who had tyrannized in ſuch a cruel manner. Though ſtrictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in the year 1536, under pretence of celebrating a feſtival which he had obtained liberty from Pizarro to attend. Upon this the ſtandard of war was immediately erected, and a moſt formidable army, according to the Spaniſh hiſtorians, of 200,000 men collected. Many Spaniards were maſſacred in their habitations, and ſeveral detachments entirely cut off; and while this vaſt army laid ſiege to Cuzco, another formidable body inveſted Lima, and kept the governor cloſely ſhut up. The greateſt effort, however, was made againſt Cuzco, which was defended by Pizarro and his two brothers, with only 170 men. The ſiege laſted nine months; many of the Spaniards were killed; among whom was Juan Pizarro, the general's brother, and the beſt beloved of them all. The reſt were reduced to the moſt deſperate ſituation, when Almagro appeared ſuddenly in the neighbourhood of Cuzco. He had received ſuch accounts of the inſurrection in Peru, as would at any rate have determined him to return to the aſſiſtance of Pizarro; but beſides this, he had now received the royal patent, creating him governor of Chili, and deemed it certain beyond all contradiction, that Cuzco lay within his jurisdiction; for which reason he hastened to prevent it from falling into the hands of the Peruvians. On his arrival his assistance was solicited by both parties. The Inca made many advantageous proposals; but at length despairing of obtaining any cordial union with a Spaniard, he attacked him in the night by surprise with a great body of chosen troops. But the Spanish valour and discipline prevailed against all the numbers of their enemies; and the Peruvians were repulsed with such slaughter, that a great part of the remainder dispersed, and Almagro advanced to the gates of Cuzco without opposition. Pizarro's brothers took measures to oppose his entrance; but prudence for the present restrained both parties from entering into a civil war while they were surrounded with enemies; and therefore each leader endeavoured to corrupt the followers of his antagonist. In this Almagro had the advantage; and so many of Pizarro's troops deserted in the night, that Almagro was encouraged to advance towards the city, where he surprised the centinels; and investing the house where the two brothers were lodged, he compelled them, after an obstinate defence, to surrender at discretion; and Almagro's authority over Cuzco was immediately recognized as authentic.

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In this fray only two or three persons were killed; but matters soon began to wear a more serious aspect. Francis Pizarro, having dispersed the Peruvians who invested Lima, and received considerable reinforcements from other provinces, ordered 500 men under the command of Alonso de Alvarado to march to Cuzco, in hopes of relieving his brothers, if they were not already cut off. They advanced to a small distance from the capital, before they knew that they had a more formidable enemy than the Indians to encounter. When they saw their countrymen drawn up on the banks of a river to oppose them, they were greatly surprised; however, Almagro, who wished rather to gain them than to fight, began with attempting to seduce their leader. Alvarado could not by any means be gained over; but being inferior in military skill, Almagro attacked him by surprise, entirely defeated and dispersed his army, taking himself and some of his principal officers prisoners.

This victory seemed decisive; and Almagro was advised to make it so by putting to death Gonzalo and Ferdinand Pizarro, Alvarado, and some others whom he could not hope to gain. This advice, however, he declined from motives of humanity, and a desire of making his adversary appear the aggressor. For these reasons, instead of marching directly against Pizarro, he retired quietly to Cuzco; which gave his adversary time to recollect himself from the disorder into which the news of so many disasters had thrown him. He began again to practise upon Almagro those arts which had before proved successful; and Almagro again suffered himself to be deceived by pretended offers of pacification. The negotiations for this purpose were protracted for several months; and while Almagro was employed in detecting and eluding the fraudulent intentions of the governor, Gonzalo Pizarro and Alvarado found means to corrupt the soldiers who guarded them, and not only made their own escape, but persuaded 60 of Almagro's men to accompany them. There now remained only Ferdinand Pizarro in the hands of Almagro; and he was delivered by another act of treachery. The general proposed that all points of controversy should be submitted to the decision of their sovereign; and that Ferdinand Pizarro should be instantly set at liberty, and return to Spain, together with some officers whom the general proposed to send over to shew the justice of his claims. Though the intention of Pizarro by making this proposal was evident, Almagro was deceived by it, and released those whom Pizarro wanted; which he had no sooner done, than the latter threw off all disguise, and openly declared, that arms alone must now decide the matter between them. He therefore immediately set out for Cuzco with an army of 700 men, to which Almagro had only 500 to oppose. From the weakness of his forces, probably, Almagro did not attempt to guard some strong passes, through which Pizarro had to march, but waited patiently for his adversary in a plain open country.

30
Almagro defeated and taken prisoner,

In the mean time, Pizarro advanced without any obstruction from his enemy; and an engagement soon happened, in which Almagro was defeated and taken prisoner. The conquerors behaved with great cruelty, massacring a great number of officers, and treating Almagro himself with great severity. The Indians had assembled in great numbers to see the battle, with an intention to join the vanquished party; but were so much overawed by the Spaniards, that they retired quietly after the battle was over, and thus lost the only opportunity they ever had of expelling their tyrants.—Almagro, after having for some months languished in prison, was at length formally tried, and condemned to die by Pizarro. Notwithstanding his consummate bravery, for which he was remarkable, this hardy veteran could not bear the deliberate approach of death, but condescended to use intreaties to save his life. The Pizarros, however, continued inflexible; and he was first strangled in prison, and then publicly beheaded. He left one son by an Indian woman, whom he appointed his successor, by virtue of a power granted him by the emperor.

31
and strangled.

As during these dissensions all intercourse with Spain ceased, it was some time before the accounts of the civil war were received at court. The first intelligence was given by some of Almagro's soldiers, who had left America on the ruin of their cause; and they did not fail to represent the injustice and violence of Pizarro in the strongest colours, which strongly prejudiced the emperor against him. In a short time, however, Ferdinand Pizarro arrived, and endeavoured to give matters a new turn. The emperor was uncertain which of them he ought to believe; and therefore thought it necessary to send over some person with ample powers to inquire into the merits of the cause, and to determine certainly who was in the wrong. If he found the governor still alive, he was to assume only the title of judge, in order to have the appearance of acting in concert with him; but if he was dead, the viceroy might then produce his commission appointing him Pizarro's successor in the government. This complaisance to Pizarro, however, proceeded more from a dread of his power than from any other thing; for in the mean time, his brother Ferdinand was arrested at Madrid, and confined to a priſon, where he remained above 20 years. The perſon nominated to this important truſt was Chriſtoval Vaca de Caſtro.

32 Peru divided by Pizarro among his aſſociates.

While this gentleman was preparing for his voyage, Pizarro, conſidering himſelf as the unrivalled maſter of Peru, proceeded to parcel out its territories among the conquerors; and had this diviſion been made with any degree of impartiality, the extent of country which he had to beſtow was ſufficient to have gratified his friends, and to have gained his enemies. But Pizarro conducted this tranſaction, not with the equity and candour of a judge attentive to diſcover and to reward merit, but with the illiberal ſpirit of a party-leader. Large diſtricts, in parts of the country moſt cultivated and populous, were ſet apart as his own property, or granted to his brothers, his adherents, and favourites. To others, lots leſs valuable and inviting were aſſigned. The followers of Almagro, amongſt whom were many of the original adventurers, to whoſe valour and perſeverance Pizarro was indebted for his ſucceſs, were totally excluded from any portion in thoſe lands, towards the acquiſition of which they had contributed ſo largely. As the vanity of every individual ſets an immoderate value upon his own ſervices, and the idea of each, concerning the recompence due to them, roſe gradually to a more exorbitant height in proportion as their conqueſts extended, all who were diſappointed in their expectations exclaimed loudly againſt the rapaciouſneſs and partiality of the governor. The partiſans of Almagro murmured in ſecret, and meditated revenge.

Rapid as the progreſs of the Spaniards in South America had been ſince Pizarro landed in Peru, their avidity of dominion was not yet ſatisfied. The officers to whom Ferdinand Pizarro gave the command of different detachments, penetrated into ſeveral new provinces; and though ſome of them were expoſed to great hardſhips in the cold and barren regions of the Andes, and others ſuffered diſtreſs not inferior amidſt the woods and marſhes of the plains, they made diſcoveries and conqueſts which extended their knowledge of the country, as well as added to their power. Pedro de Valdivia re-aſſumed Almagro's ſcheme of invading Chili; and, notwithſtanding the fortitude of the natives in defending their poſſeſſions, made ſuch progreſs in the conqueſt of the country, that he founded the city of St Jago, and gave a beginning to the eſtabliſhment of the Spaniſh dominion there. But of all the enterpriſes undertaken about this period, that of Gonzales Pizarro was the moſt remarkable.

33 Expedition of Gonzales Pizarro.

The governor, who ſeems to have reſolved that no perſon in Peru ſhould poſſeſs any ſtation of diſtinguiſhed eminence or authority but thoſe of his own family, had deprived Benalcazar, the conqueror of Quito, of his command in that kingdom, and appointed his brother Gonzales to take the government of it. He inſtructed him to attempt the diſcovery and conqueſt of the country to the eaſt of the Andes; which, according to the information of the Indians, abounded with cinnamon and other valuable ſpices. Gonzales, not inferior to any of his brothers in courage, and no leſs ambitious of acquiring diſtinction, eagerly engaged in this difficult ſervice. He ſet out from Quito at the head of 340 ſoldiers, near one half of whom were horſemen, with 4000 Indians to carry their proviſions. In forcing their way through the defiles, or over the ridges of the Andes, exceſs of cold and fatigue, to neither of which they were accuſtomed, proved fatal to the greater part of the wretched attendants. The Spaniards, though more robuſt, and inured to a variety of climates, ſuffered conſiderably, and loſt ſome men; but when they deſcended into the low country, their diſtreſs increaſed. During two months it rained inceſſantly, without any interval of fair weather long enough to dry their clothes. The vaſt plains upon which they were now entering, either altogether without inhabitants, or occupied by the rudeſt and leaſt induſtrious tribes in the New World, yielded little ſubſiſtence. They could not advance a ſtep but as they cut a road through woods, or made it through marſhes. Such inceſſant toil, and continual ſcarcity of food, ſeem more than ſufficient to have exhauſted and diſpirited any troops. But the fortitude and perſeverance of the Spaniards in the 16th century were inſuperable. Allured by frequent but falſe accounts of rich countries before them, they perſiſted in ſtruggling on, until they reached the banks of the Coca or Napo, one of the large rivers whoſe waters pour into the Maragnon, and contribute to its grandeur. There, with infinite labour, they built a bark, which they expected would prove of great utility, both in conveying them over rivers, in procuring proviſions, and in exploring the country. This was manned with 50 ſoldiers, under the command of Francis Orellana, the officer next in rank to Pizarro. The ſtream carried them down with ſuch rapidity, that they were ſoon far a-head of their countrymen, who followed ſlowly and with difficulty by land.

34 Orellana fails down the river Maragnon, and deſerts Pizarro.

At this diſtance from his commander, Orellana, a young man of an aſpiring mind, began to fancy himſelf independent; and, tranſported with the predominant paſſion of the age, he formed the ſcheme of diſtinguiſhing himſelf as a diſcoverer, by following the courſe of the Maragnon until it joined the ocean, and by ſurveying the vaſt regions through which it flows. This ſcheme of Orellana's was as bold as it was treacherous. For, if he be chargeable with the guilt of having violated his duty to his commander, and with having abandoned his fellow-ſoldiers in a pathleſs deſert, where they had hardly any hopes of ſucceſs, or even of ſafety, but what were founded on the ſervice which they expected from the bark, his crime is, in ſome meaſure, balanced by the glory of having ventured upon a navigation of near 2000 leagues, through unknown nations, in a veſſel haſtily conſtructed with green timber, and by very unſkilful hands, without proviſions, without a compaſs, or a pilot. But his courage and alacrity ſupplied every defect. Committing himſelf fearleſsly to the guidance of the ſtream, the Napo bore him along to the ſouth, until he reached the great channel of the Maragnon. Turning with it towards the coaſt, he held on his courſe in that direction. He made frequent deſcents on both ſides the river, ſometimes ſeizing by force of arms the proviſions of the fierce ſavages ſeated on its banks, and ſometimes procuring a ſupply of food by a friendly intercourſe with more gentle tribes. After a long ſeries of dangers, which he encountered with amazing fortitude, and of diſtreſſes which he ſupported with no leſs magnanimity, he reached the ocean, where new perils awaited him. Theſe he likewiſe ſurmounted, and got ſafe to the

Peru. the Spaniſh ſettlement in the iſland Cubagua; from thence he ſailed to Spain. The vanity natural to travellers who viſit regions unknown to the reſt of mankind, and the art of an adventurer, ſolicitous to magnify his own merit, concurred in prompting him to mingle an extraordinary proportion of the marvellous in the narrative of his voyage. He pretended to have diſcovered nations ſo rich, that the roofs of their temples were covered with plates of gold; and deſcribed a republic of women ſo warlike and powerful, as to have extended their dominion over a conſiderable tract of the fertile plains which he had viſited. Extravagant as thoſe tales were, they gave riſe to an opinion, that a region abounding with gold, diſtinguiſhed by the name of *El Dorado*, and a community of Amazons, were to be found in this part of the New World; and ſuch is the propenſity of mankind to believe what is wonderful, that it has been ſlowly, and with difficulty, that reaſon and obſervation have exploded thoſe fables. The voyage, however, even when ſtripped of every romantic embelliſhment, deſerves to be recorded, not only as one of the moſt memorable occurrences in that adventrous age, but as the firſt event that led to any certain knowledge of thoſe immenſe regions that ſtretch eaſtward from the Andes to the ocean.

No words can deſcribe the conſternation of Pizarro, when he did not find the bark at the confluence of the Napo and Maragnon, where he had ordered Orellana to wait for him. He would not allow himſelf to ſuſpect that a man, whom he had entruſted with ſuch an important command, could be ſo baſe and ſo unfeeling as to deſert him at ſuch a juncture. But imputing his abſence from the place of rendezvous to ſome unknown accident, he advanced above 50 leagues along the banks of the Maragnon, expecting every moment to ſee the bark appear with a ſupply of proviſions. At length he came up with an officer whom Orellana had left to periſh in the deſert, becauſe he had the courage to remonſtrate againſt his perfidy. From him he learned the extent of Orellana's crime; and his followers perceived at once their own deſperate ſituation, when deprived of their only reſource. The ſpirit of the ſtouteſt hearted veteran ſunk within him; and all demanded to be led back inſtantly. Pizarro, though he aſſumed an appearance of tranquillity, did not oppoſe their inclination. But he was now 1200 miles from Quito; and in that long march the Spaniards encountered hardſhips greater than thoſe they had endured in their progreſs outward, without the alluring hopes which then ſoothed and animated them under their ſufferings. Hunger compelled them to feed on roots and berries, to eat all their dogs and horſes, to devour the moſt loathſome reptiles, and even to gnaw the leather of their ſaddles and ſword-belts. Four thouſand Indians, and 210 Spaniards, periſhed in this wild and diſaſtrous expedition, which continued near two years: and as 50 men were aboard the bark with Orellana, only 80 got back to Quito. Theſe were naked like ſavages, and ſo emaciated with famine, or worn out with fatigue, that they had more the appearance of ſpectres than of men.

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But, inſtead of returning to enjoy the repoſe which his condition required, Pizarro, on entering Quito, received accounts of a fatal event that threatened calamities more dreadful to him than thoſe through which he had paſſed. From the time that his [illegible] made that partial diviſion of his conqueſt which has been mentioned, the adherents of Almagro, conſidering themſelves as proſcribed by the party in power, no longer entertained any hope of bettering their condition. Great numbers in deſpair reſorted to Lima, where the houſe of young Almagro was always open to them, and the ſlender portion of his father's fortune, which the governor allowed him to enjoy, was ſpent in affording them ſubſiſtence. The warm attachment with which every perſon who ſerved under the elder Almagro devoted himſelf to his intereſts, was quickly transferred to his ſon, who was now grown up to the age of manhood, and poſſeſſed all the qualities which captivate the affections of ſoldiers. Of a graceful appearance, dexterous at all martial exerciſes, bold, open, generous, he ſeemed to be formed for command; and as his father, conſcious of his own inferiority from the total want of education, had been extremely attentive to have him inſtructed in every ſcience becoming a gentleman, the accompliſhments which he had acquired heightened the reſpect of his followers, as they gave him diſtinction and eminence among illiterate adventurers. In this young man the Almagrians found a point of union which they wanted; and looking up to him as their head, were ready to undertake any thing for his advancement. Nor was affection for Almagro their only incitement; they were urged on by their own diſtreſſes. Many of them, deſtitute of common neceſſaries, and weary of loitering away life, a burden to their chief, or to ſuch of their aſſociates as had ſaved ſome remnant of their fortune from pillage and confiſcation, longed impatiently for an occaſion to exert their activity and courage, and began to deliberate how they might be avenged on the author of all their miſery. Their frequent cabals did not paſs unobſerved; and the governor was warned to be on his guard againſt men who meditated ſome deſperate deed, and had reſolution to execute it. But, either from the native intrepidity of his mind, or from contempt of perſons whoſe poverty rendered their machinations of little conſequence, he diſregarded the admonitions of his friends. "Be in no pain (ſaid he careleſly) about my life; it is perfectly ſafe, as long as every man in Peru knows that I can in a moment put him to death who dares to harbour a thought againſt it." This ſecurity gave the Almagrians full leiſure to digeſt and ripen every part of their ſcheme; and Juan de Herrada, an officer of great abilities, who had the charge of Almagro's education, took the lead in their conſultations, with all the zeal which that connection inſpired, and with all the authority which the aſcendant that he was known to have over the mind of his pupil gave him.

37
murdered.

On Sunday, the 20th of June, at midday, the ſeaſon of tranquillity and repoſe in all ſultry climates, Herrada, at the head of 18 of the moſt determined conſpirators, ſallied out of Almagro's houſe in complete armour; and drawing their ſwords, as they advanced haſtily towards the governor's palace, cried out, "Long live the king, but let the tyrant die." Their aſſociates, warned of their motions by a ſignal, were in arms at different ſtations ready to ſupport them. Though Pizarro was uſually ſurrounded by ſuch a numerous train of attendants as ſuited the magnificence of the moſt opulent ſubject of the age in which he lived, yet as he was juſt riſen from table, and moſt of his [illegible] retired to their own apartments, the conſpirators paſſed through the two outer courts of the palace unobſerved. They were at the bottom of the ſtaircaſe, before a page in waiting could give the alarm to his maſter, who was converſing with a few friends in a large hall. The governor, whoſe ſteady mind no form of danger could appal, ſtarting up, called for arms, and commanded Franciſco de Chaves to make faſt the door. But that officer, who did not retain ſo much preſence of mind as to obey this prudent order, running to the top of the ſtaircaſe, wildly aſked the conſpirators what they meant, and whither they were going? Inſtead of anſwering, they ſtabbed him to the heart, and burſt into the hall. Some of the perſons who were there threw themſelves from the windows; others attempted to fly; and a few drawing their ſwords, followed their leader into an inner apartment. The conſpirators, animated with having the object of their vengeance now in view, ruſhed forward after them. Pizarro, with no other arms than his ſword and buckler defended the entry, and, ſupported by his half-brother Alcantara and his little knot of friends, maintained the unequal conteſt with intrepidity worthy of his paſt exploits, and with the vigour of a youthful combatant. "Courage (cried he), companions, we are yet enow to make thoſe traitors repent of their audacity." But the armour of the conſpirators protected them, while every thruſt they made took effect. Alcantara fell dead at his brother's feet; his other defendants were mortally wounded. The governor, ſo weary that he could hardly wield his ſword, and no longer able to parry the many weapons furiouſly aimed at him, received a deadly thruſt full in his throat, ſunk to the ground, and expired.

38
Young Almagro heads the rebels.

As ſoon as he was ſlain, the aſſaſſins ran out into the ſtreets, and waving their bloody ſwords, proclaimed the death of the tyrant. Above 200 of their aſſociates having joined them, they conducted young Almagro in ſolemn proceſſion through the city; and aſſembling the magiſtrates and principal citizens, compelled them to acknowledge him as lawful ſucceſſor to his father in his government. The palace of Pizarro, together with the houſes of ſeveral of his adherents, were pillaged by the ſoldiers; who had the ſatisfaction at once of being avenged on their enemies, and of enriching themſelves by the ſpoils of thoſe through whoſe hands all the wealth of Peru had paſſed.

The new governor marched into the heart of the empire, in order to reduce ſuch places as refuſed to acknowledge his authority. A multitude of ruffians joined him on his march. His army breathed nothing but vengeance and plunder: every thing gave way before it. If the military talents of the general had equalled the ardour of his troops, the war had ended here. Unhappily for Almagro, he had loſt his conductor John de Herrada. His inexperience made him fall into the ſnares that were laid for him by Pedro Alvares, who had put himſelf at the head of the oppoſite party. He loſt, in attempting to unravel his plots, that time that he ought to have employed in fighting. In theſe circumſtances, an event, which no one could have foreſeen, happened to change the face of affairs.

The licentiate Vaca di Caſtro, who had been ſent from Europe to try the murderers of old Almagro, arrived at Peru. As he was appointed to aſſume the government in caſe Pizarro was no more, all who had not ſold themſelves to the tyrant haſtened to acknowledge him. Uncertainty and jealouſy, which had for too long a time kept them diſperſed, were no longer an obſtacle to their re-union. Caſtro, who was as reſolute as if he had grown old in the ſervice, did not ſuffer their impatience to languiſh, but inſtantly led them againſt the enemy. The two armies engaged at Chapas on the 16th of September 1542, and fought with inexpreſſible obſtinacy. Victory, after having wavered a long time, at the cloſe of the day decided in favour of that party whoſe cauſe was the moſt juſt. Thoſe among the rebels who were moſt guilty, dreading to languiſh under diſgraceful tortures, provoked the conquerors to murder them, crying out, like men in deſpair, *It was I who killed Pizarro.* Their chief was taken priſoner, and died on the ſcaffold.

39
He is defeated by Vaca di Caſtro.

While theſe ſcenes of horrors were tranſacting in America, the Spaniards in Europe were employed in finding out expedients to terminate them; though no meaſures had been taken to prevent them. Peru had only been made ſubject to the audience of Panama, which was too remote to ſuperintend the maintenance of good order, and had too little influence to make its decrees reſpected. A ſupreme tribunal was then eſtabliſhed at Lima for the diſpenſation of juſtice, which was to be inveſted with authority ſufficient to enforce and to reward a due obedience to the laws. Blaſco Nunez Vela, who preſided in it as viceroy, arrived in 1544, attended by his ſubordinates in office, and found every thing in the moſt dreadful diſorder.

To put an end to thoſe tumults which now ſubſiſted, would have required a profound genius, and many other qualities which are ſeldom united. Nunez had none of theſe advantages. Nature had only given him probity, firmneſs, and ardour; and he had taken no pains to improve theſe gifts. With theſe virtues, which were almoſt defects in his ſituation, he began to fulfil his commiſſion, without regard to places, perſons, or circumſtances.

40
Bad conduct of the viceroy Nunez Vela.

Contrary to the opinion of all intelligent perſons, who wiſhed that he ſhould wait for freſh inſtructions from Europe, he publiſhed ordinances, which declared that the lands the conquerors had ſeized ſhould not paſs to their deſcendants, and which diſpoſſeſſed thoſe who had taken part in the civil commotions. All the Peruvians who had been enſlaved by monks, biſhops, and perſons belonging to the government, were declared free. Thoſe who belonged to other maſters were to be freed from their ſhackles at the death of their oppreſſors. They could no longer be compelled to bury themſelves in the mines, nor could any kind of labour be exacted from them without payment. Their tribute was fixed. The Spaniards who travelled on foot were deprived of the right of taking three Indians to carry their baggage; and thoſe who travelled on horſeback, of the right of taking five. The caciques were diſcharged from the obligation of furniſhing the traveller and his retinue with proviſions gratis. Other tyrannical eſtabliſhments alſo would ſoon have been proſcribed; and the conquered people were on the eve of being ſheltered under the protection of laws, which would at leaſt have tempered the rigours of the right of conqueſt, if even they had not entirely

repaired

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repaired the injuſtice of them; but it ſhould ſeem that the Spaniſh government was only to be unfortunate in the good it attempted to effect.

A change ſo unexpected filled thoſe with conſternation who ſaw their fortunes wreſted from them, or who loſt the flattering hope of tranſmitting them to their poſterity. Even thoſe who were not affected by theſe intereſted views, being accuſtomed to look upon the Indians as the inſtruments and victims of their avarice, had no conception that any other ideas could prevail concerning them. From aſtoniſhment they proceeded to indignation, murmuring, and ſedition. The viceroy was degraded, put in irons, and baniſhed to a deſert iſland, till he could be conveyed to Spain.

Gonzales Pizarro was then returned from his hazardous expedition, which had employed him long enough to prevent him from taking a part in thoſe revolutions which had ſo rapidly ſucceeded each other. The anarchy he found prevailing at his return, inſpired him with the idea of ſeizing the ſupreme authority. His fame and his forces made it impoſſible that this ſhould be refuſed him; but his uſurpation was marked with ſo many enormities, that Nunez was regretted. He was recalled from exile, and ſoon collected a ſufficient number of forces to enable him to take the field. Civil commotions were then renewed with extreme fury by both parties. No quarter was aſked or given on either ſide. The Indians took part in this as they had done in the preceding wars; ſome ranged themſelves under the ſtandard of the viceroy, others under the banners of Gonzales. From 15,000 to 20,000 of theſe unhappy wretches, who were ſcattered about in each army, dragged up the artillery, levelled the roads, carried the baggage, and deſtroyed one another. Their conquerors had taught them to be ſanguinary. After a variety of advantages for a long time alternately obtained, fortune at length favoured the rebellion under the walls of Quito in the month of January, in the year 1545; and Nunez with the greateſt part of his men were maſſacred.

41
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Pizarro took the road of Lima, where they were deliberating on the ceremonies with which they ſhould receive him. Some officers wiſhed that a canopy ſhould be carried for him to march under, after the manner of kings. Others, with adulation ſtill more extravagant, pretended that part of the walls of the town, and even ſome houſes, muſt be pulled down; as was the cuſtom at Rome, when a general obtained the honours of a triumph. Gonzales contented himſelf with making his entrance on horſeback, preceded by his lieutenant, who marched on foot. Four biſhops accompanied him, and he was followed by the magiſtrates. The ſtreets were ſtrewn with flowers, and the air reſounded with the noiſe of bells and various muſical inſtruments. This homage totally turned the head of a man naturally haughty, and of confined ideas. He ſpoke and acted in the moſt deſpotic manner.

Had Gonzales poſſeſſed judgement and the appearance of moderation, it would have been poſſible for him to render himſelf independent. The principal perſons of his party wiſhed it. The majority would have beheld this event with indifference, and the reſt would have been obliged to conſent to it. Blind cruelties, inſatiable avarice, and unbounded pride, altered theſe diſpoſitions. Even thoſe, whoſe intereſts were connected with thoſe of the tyrant, wiſhed for a deliverer.

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Such a deliverer arrived from Europe in the perſon of the licentiate Pedro di la Gaſca. The Spaniards ſettled in the provinces of the mountains immediately declared for a perſon who was inveſted with a lawful authority to govern them. Thoſe who lived concealed in deſerts, caverns, and foreſts, quitted their retreats to join him. Gonzales, who ſaw no reſource left to ſupport him but in ſome great atchievement, took the road of Cuzco, with a reſolution to give battle. At ſome leagues diſtance from this place he met the royal army, and attacked it on the 9th of June 1548. One of his lieutenants, ſeeing him abandoned at the firſt charge by his beſt ſoldiers, adviſed him to throw himſelf into the enemy's battalions, and periſh like a Roman: but this weak man choſe rather to ſurrender, and end his life on a ſcaffold. Carvajal, a more able warrior, and more ferocious than himſelf, was quartered. This man, when he was expiring, boaſted that he had maſſacred with his own hand 1400 Spaniards and 20,000 Indians.

42
An end put
[illegible]
bles by
[illegible]
Gaſca.

Such was the laſt ſcene of a tragedy, of which every act has been marked with blood. The government was moderate enough not to continue the proſcriptions; and the remembrance of the horrid calamities they had ſuffered kept the Spaniards in the bounds of ſubjection. What ſtill remained of that commotion that had been raiſed in their minds, inſenſibly ſunk into a calm; and the country hath remained in quiet ever ſince.

43
Hard fate
of the Peruvians.

With regard to the Peruvians, the moſt cruel meaſures were taken to render it impoſſible for them to rebel. Tupac Amaru, the heir of their laſt king, had taken refuge in ſome remote mountains, where he lived in peace. There he was ſo cloſely ſurrounded by the troops which had been ſent out againſt him, that he was forced to ſurrender. The viceroy Francis de Toledo cauſed him to be accuſed of ſeveral crimes that he had not committed, and for which he was beheaded in 1571. All the other deſcendants of the Incas ſhared the ſame fate, under pretence that they had conſpired againſt their conquerors. The horror of theſe enormities excited ſo univerſal an indignation both in the Old and the New World, that Philip II. thought himſelf obliged to diſavow them; but the infamous policy of this prince was ſo notorious, that no credit was given to this appearance of his juſtice and humanity.

44
Extent of
the empire.

The empire of Peru, at the time it was ſubdued, extended along the South ſea, from the river of Emeralds to Chili, and on the land ſide to Popayan, according to ſome geographers. It contained within its extent that famous chain of mountains which riſes in the Terra Magellanica, and is gradually loſt in Mexico, in order to unite, as it ſhould ſeem, the ſouthern parts of America with the northern.

Payne's Geography.

It is now divided into three grand diviſions or audiences; Quito, Lima or Los Reyes, and Los Charcos. As to its climate, mines, ſoil, and produce, they differ greatly in different parts of the country.

45
Province of
Quito.

The extenſive province of Quito is bounded on the north by Popayan, and includes a part of that government, alſo by Santa Fe de Bogota; on the ſouth by the governments of Piura and Chachapoyas; on the eaſt it extends over the whole government of Maynas and the river of the Amazons to the meridian, which divides the Spaniſh from the Portugueſe dominions; and on the weſt it is bounded by the South ſea; extending, according to Antonio de Ulloa, 600 leagues in length, and about 200 in its greateſt breadth; but this greatly exceeds the computation of all other geographers. He however obſerves, that it muſt be owned a great part of thoſe vaſt dominions are either inhabited by nations of Indians, or have not hitherto been ſufficiently peopled by the Spaniards, if indeed they have been thoroughly known; and that all the parts that can properly be ſaid to be peopled, and actually ſubject to the Spaniſh government, are thoſe intercepted by the two Cordilleras of the Andes, which, in compariſon to the extent of the country, may be termed a ſtreet or lane, 15 leagues, or ſometimes more, from eaſt to weſt; to this muſt be added ſeveral detached governments, ſeparated by the very extenſive tracts inhabited by free Indians.

46
Climate, ſeaſons, &c. of this province.

The climate of Quito differs from all others in the ſame parallel, ſince even in the centre of the torrid zone, or although under the equinoctial, the heat is not only very tolerable, but even in ſome places the cold is painful; while others enjoy all the advantages of a perpetual ſpring, the fields being conſtantly covered with verdure, and enamelled with flowers of the moſt lively colours. The mildneſs of the climate, free from the extremes of heat and cold, and the conſtant equality of the day and night, render this country, which from its ſituation might be thought to be parched by the conſtant heat of the ſun, and ſcarcely inhabitable, both pleaſant and fertile; for nature has here diſpenſed her bleſſings with ſo liberal a hand, that this country in ſeveral reſpects ſurpaſſes thoſe of the temperate zones, where the viciſſitudes of winter and ſummer, and the change from heat to cold, cauſe the extremes of both to be more ſenſibly felt. However, in different parts of the country, the air is very different; in one part are mountains of a ſtupendous height and magnitude, with their ſummits covered with ſnow. The plains are temperate, the valleys hot, and, according to the high or low ſituation of the country, are found all the variety of gradations in temperature poſſible to be conceived between the extremes of heat and cold.

Quito, the capital, in 13′ ſouth latitude, and 77° 50′ weſt longitude from Greenwich, is ſo happily ſituated, that neither heat nor cold are troubleſome, though both may be felt in its neighbourhood; and what renders this equality more delightful is, that it is conſtant throughout the whole year, the difference between the ſeaſons being ſcarce perceptible. Indeed the mornings are cool, the remainder of the day warm, and the nights of an agreeable temperature. See Quito.

The winds, which are pure and ſalubrious, blow for the moſt part from north to ſouth, but never with any violence, though they ſometimes ſhift their quarters, but without any regard to the ſeaſon of the year. Such ſignal advantages reſulting from the climate, ſoil, and aſpect of this country, would be ſufficient to render it the moſt enviable ſpot upon earth, as it is ſuppoſed to be the moſt elevated, if, whilſt enjoying theſe delights, the inhabitants were not haraſſed by terror, and expoſed to continual danger; for here tremendous tempeſts of thunder and lightning prevail, which are ſufficient to appal the ſtouteſt heart; whilſt earthquakes frequently ſpread univerſal apprehenſions, and ſometimes lay cities in ruins.

The diſtinction of winter and ſummer conſiſts in a very minute difference; the interval between the month of September and thoſe of April, May, or June, is here called the winter ſeaſon, and the other months compoſe the ſummer. In the former ſeaſon the rain chiefly prevails, and in the latter the inhabitants frequently enjoy whole days of fine weather; but whenever the rains are diſcontinued for above a fortnight, the inhabitants are in the utmoſt conſternation, and public prayers are offered up for their return. On the other hand, when they continue a ſhort time without intermiſſion, the like fears prevail, and the churches are again crowded with ſupplicants to obtain fine weather; for a long drought produces dangerous diſeaſes, and a continual rain, without intervals of ſunſhine, deſtroys the fruits of the earth. The city of Quito, however, enjoys one peculiar advantage, in being free from muſketoes and other troubleſome inſects, ſuch as fleas and venomous reptiles, except the *nigua* or *pique*, which is a very ſmall inſect ſhaped like a flea, but hardly viſible to the ſight.

47
Soil, produce, &c.

The fertility of the ſoil here is incredible, for the fruits and beauties of the ſeveral ſeaſons are viſible at the ſame time; and the curious European obſerves with a pleaſing admiration, that while ſome herbs of the field are fading, others of the ſame kind are ſpringing up; while ſome flowers loſe their beauty, others blow to continue the enamelled proſpect: thus, when the fruits of the trees have attained their maturity, and the leaves begin to change their colour, freſh leaves bloſſom, and fruits are ſeen in their proper gradations in ſize and ripeneſs on the ſame tree. The ſame inceſſant fertility is conſpicuous in the corn, both reaping and ſowing being carried on at the ſame time: ſo that the declivities of the neighbouring hills exhibit all the beauties of the four ſeaſons in one aſſemblage. Though all this is generally ſeen, yet there is a ſettled time for the grand harveſt: yet ſometimes the moſt favourable ſeaſon for ſowing in one place is a month or two after that of another, though their diſtance does not exceed three or four leagues. Thus in different ſpots, and ſometimes in one and the ſame, ſowing and reaping are performed throughout the whole year, the forwardneſs or retardment naturally ariſing from the different ſituations, ſuch as mountains, riſing grounds, plains, and valleys; and the temperature being different in each, the beſt times for performing the ſeveral operations of huſbandry muſt alſo differ.

The *chirimoya* is conſidered as one of the moſt delicious fruits in the world. Its dimenſions are various, being from one to five inches in diameter. Its figure is imperfectly round, flatted towards the ſtalk, where it forms a kind of navel; but all the other parts are nearly circular. It is covered with a thin ſoft ſhell, which adheres ſo cloſely to the pulp as not to be ſeparated from it without a knife. The outward coat is green, variegated with prominent veins, forming all over it a kind of net-work. The pulp is white, and contains a large quantity of juice reſembling honey, of a ſweet taſte, mixed with a gentle acid of a moſt exquiſite flavour. The ſeeds are formed in ſeveral parts of the pulp, and are ſomewhat flat. The tree is high and tufted, the ſtem large and round, but with ſome inequalities,

qualities, full of elliptic leaves, terminating in a point. The bloſſom differs little from the colour of the leaves, which is a darkiſh green; and though far from being beautiful, is remarkable for its incomparable fragrance.

The *granadilla* in its ſhape reſembles an hen's egg, but is larger. The outſide of the ſhell is ſmooth, gloſſy, and of a faint carnation colour, and the inſide white and ſoft. The ſhell contains a viſcous liquid ſubſtance, full of very ſmall and delicate grains, leſs hard than thoſe of the pomegranate. This medullary ſubſtance is ſeparated from the ſhell by a fine and tranſparent membrane. Its fruit has a delightful ſweetneſs blended with acidity, very cordial and refreſhing, and ſo wholeſome, that there is no danger of eating to exceſs.

The *frutilla*, or Peruvian ſtrawberry, is very different from that of Europe in ſize; though they are here generally not above an inch in length, they are much larger in other parts of Peru; but their taſte, though juicy, and not unpalatable, is not equal to thoſe in Europe.

48 Inhabitants. The country is obſerved to abound more in women than in men, which is the more remarkable, as thoſe cauſes which induce men to leave their country, as travelling, commerce, and war, naturally bring over more men from Europe than women. But there are many families in which there are a number of daughters, without one ſon among them. The women enjoy a better ſtate of health than the men, which may be owing in ſome meaſure to the climate, and more particularly to the early intemperance and voluptuouſneſs of the other ſex.

The Creoles are well made, of a proper ſtature, and of a lively and agreeable countenance. The Meſtizos are alſo in general well made, often taller than the ordinary ſize, very robuſt, and have an agreeable air. The Indians, both men and women, are commonly low of ſtature, though ſtrong and well proportioned; but more natural defects are to be found among them than in any of the reſt. Some are remarkably ſhort, ſome idiots, dumb, or blind. Their hair is generally thick and long, which they wear looſe on their ſhoulders; but the Indian women plait theirs behind with a ribbon, and cut that before a little above the eyebrows, from one ear to the other. The greateſt diſgrace that can be offered to an Indian of either ſex is to cut off their hair; for whatever corporal puniſhment their maſters think proper to inflict on them, they bear with patience; but this affront they never forgive; and accordingly the government has interpoſed, and limited this puniſhment to the moſt enormous crimes. The colour of the hair is generally a deep black: it is lank, harſh, and as coarſe as that of a horſe. On the contrary, the male Meſtizos, in order to diſtinguiſh themſelves from the Indians, cut off their hair; but the females do not adopt that cuſtom.

49 Their dreſs. The Meſtizos in general wear a blue cloth, manufactured in this country; but though they are the loweſt claſs of Spaniards, they are very ambitious of diſtinguiſhing themſelves as ſuch, either by the colour or faſhion of the clothes they wear.

The Meſtizo women affect to dreſs in the ſame manner as the Spaniſh, though they cannot equal the ladies in the richneſs of their ſtuffs. The meaner ſort wear no ſhoes; but like the men of the ſame rank go barefooted.

The dreſs of the Indians conſiſts of white cotton drawers, which hang down to the calf of the leg, where they are looſe, and edged with a lace ſuitable to the ſtuff. The uſe of a ſhirt is ſupplied by a black cotton frock, made in the form of a ſack, with three openings at the top, one in the middle for the head, and others at the corners for the arms; thus covering their naked bodies down to the knees. Over this is a ſerge cloak, with a hole in the middle for putting the head through, and a hat made by the natives. This is their general dreſs, which they never lay aſide, even while they ſleep; and they have no additional clothing for their legs or feet. The Indians, who have acquired ſome fortune, particularly the barbers and phlebotomiſts, diſtinguiſh themſelves from their countrymen by the fineneſs of their drawers, and by wearing a ſhirt, which, though without ſleeves, has a lace four or five fingers in breadth, faſtened round like a kind of ruff or band. They are fond of ſilver or gold buckles to their ſhoes, though they wear no ſtockings; and inſtead of a mean ſerge cloak, wear one of fine cloth, which is often adorned with gold or ſilver lace.

There are two kinds of dreſſes worn by the Indian women, made in the ſame plain manner with thoſe worn by the men in general, the whole conſiſting of a ſhort petticoat and a veil of American baize. But the dreſs of the loweſt claſs of Indian women is only a bag of the ſame make and ſtuff as that of the men, which they faſten on their ſhoulders with two large pins: it reaches down to the calf of the leg, and is faſtened round the waiſt with a kind of girdle. Inſtead of a veil, they wear about the neck a piece of the ſame coarſe ſtuff dyed black; but their arms and legs are naked.

50 Food and drink, &c. The people have diſhes unknown in Europe; but are particularly fond of cheeſe; and have excellent butter in the neighbourhood of Quito. Sweetmeats are very much admired.

Rum is commonly drank here by perſons of all ranks, but their favourite liquor is brandy. The diſorders ariſing from the exceſſive uſe of ſpirituous liquors are chiefly ſeen among the Meſtizos; and the lower claſs of women, both among the Creoles and Meſtizos, are alſo extremely addicted to the ſame ſpecies of debauchery.

Another liquor much uſed in this country is mate, which is made of an herb known in all theſe parts of America by the name of Paraguay, as being the produce of that country. Some of it is put into a calabaſh tipped with ſilver, called here *mate*, with ſugar and ſome cold water. After it has continued there ſome time, the calabaſh is filled with boiling water, and they drink the liquor through a pipe fixed in the calabaſh. It is alſo uſual to ſqueeze into the liquor a ſmall quantity of the juice of lemons or Seville oranges, mixed with ſome perfumes from odoriferous flowers. This is their uſual drink in the morning faſting, and many uſe it alſo at their evening regale. The manner of drinking it appears very indelicate, the whole company taking it ſucceſſively through the ſame pipe, it being carried ſeveral times round the company till all are ſatisfied. This among the Creoles is the higheſt enjoyment fo that when they travel, they never fail to carry with them a ſufficient quantity of it, and till they have taken their doſe of mate they never eat.

The vice of gaming is here carried to an extravagant height, to the ruin of many families, ſome loſing their ſtocks in trade, others the very clothes from their backs, and afterward thoſe belonging to their wives, which they hazard, ſtimulated by the hope of recovering their own.

The common people, the Indians, and even the domeſtics, are greatly addicted to ſtealing. The Meſtizos, though arrant cowards, do not want audacity in this way; for though they will not venture to attack any one in the ſtreet, it is a common practice to ſnatch off a perſon's hat, and immediately ſeek their ſafety in flight. This acquiſition is ſometimes of conſiderable value; the hats worn by perſons of rank, and even by the wealthy citizens when dreſſed, being of white beaver, worth fifteen dollars, beſide the hatband of gold or ſilver lace, faſtened with a gold buckle ſet with diamonds or emeralds. Robberies on the highway are ſeldom heard of.

51 Language. In Quito, and all the towns and villages of its province, different dialects are ſpoken, Spaniſh being no leſs common than the Inga, the language of the country. The Creoles uſe the latter as much as the former, but both are conſiderably adulterated by borrowed words and expreſſions. The firſt language generally ſpoken by children is the Inga; for the nurſes being Indians, many of them do not underſtand a word of Spaniſh, and thus they afterward learn a jargon compoſed of both languages.

52 Honour paid the dead. The ſumptuous manner of performing the laſt offices for the dead, demonſtrates how far the power of habit is capable of prevailing over reaſon and prudence, for their oſtentation is ſo great in this particular, that many families of credit are ruined by prepoſterouſly endeavouring to excel others; and the people here may be ſaid to toil and ſcheme to lay up wealth, to enable their ſucceſſors to laviſh honours upon a body inſenſible of all pageantry.

53 Commerce. The commerce of the province of Quito is chiefly carried on by Europeans ſettled here, and others who occaſionally arrive. The manufactures of this province are only cottons, ſome white and ſtriped baize, and cloths, which meet with a good market at Lima, for ſupplying the inward provinces of Peru. The returns are made partly in ſilver, and partly in fringes made of gold and ſilver thread, and wine, brandy, oil, copper, tin, lead, and quickſilver. On the arrival of the galleons at Carthagena, theſe traders reſort thither to purchaſe European goods, which, at their return, they conſign to their correſpondents all over the province. The coaſts of New Spain ſupply this province with indigo, of which there is a very large conſumption at the manufactures, blue being univerſally the colour which this people adopt for their apparel. They alſo import, by way of Guayaquila, iron and ſteel both from Europe and the coaſt of Guatemala.

54 Diſpoſition of the inhabitants. The diſpoſition of the Indians in the province of Quito is extremely remarkable, and they appear to have no reſemblance to the people found there by thoſe who firſt diſcovered the country. They at preſent poſſeſs a tranquillity not to be diſturbed either by fortunate or unfortunate events. In their mean apparel they are as contented as a prince clothed in the moſt ſplendid robes. They ſhow the ſame diſregard to riches; and even the authority and grandeur within their reach is ſo little the object of their ambition, that to all appearance it ſeems to be the ſame to an Indian whether he be created an alcalde, or obliged to perform the office of a common executioner.

Their ſloth is ſo great that ſcarcely any thing can induce them to work. Whatever therefore is neceſſary to be done is left to the Indian women, who are much more active; they ſpin and make the half ſhirts and drawers which form the only apparel of their huſbands; they cook the proviſions, grind barley, and brew the beer called *chicha*; while the huſband ſits ſquatting on his hams, the uſual poſture of the Indians, looking at his buſy wife. The only domeſtic ſervice they do is to plough their little ſpot of land, which is ſowed by the wife. When they are once ſeated on their hams, no reward can induce them to ſtir; ſo that if a traveller has loſt his way, and happens to come to one of their cottages, they charge their wives to ſay that they are not at home. Should the paſſenger alight and enter the cottage, the Indian would ſtill be ſafe; for having no light but what comes through a hole in the door, he could not be diſcovered; and ſhould the ſtranger even ſee the Indian, neither entreaties nor rewards would prevail on him to ſtir a ſtep with him.

They are lively only in parties of pleaſure, rejoicings, entertainments, and eſpecially dancing; but in all theſe the liquor muſt circulate briſkly, and they continue drinking till they are entirely deprived both of ſenſe and motion.

It is remarkable that the Indian women, whether maids or married, and Indian young men before they are of an age to contract matrimony, are never guilty of this vice: it being a maxim among them, that drunkenneſs is the privilege of none but maſters of families, who, when they are unable to take care of themſelves, have others to take care of them.

The women preſent the chicha (A) to their huſbands in calabaſhes, till their ſpirits are raiſed; then one plays on a pipe and tabor, while others dance. Some of the beſt voices among the Indian women ſing ſongs in their own language, and thoſe who do not dance, ſquat down in the uſual poſture till it comes to their turn. When tired with intemperance, they all lie down together, without regarding whether they be near the wife of another or their own ſiſter or daughter. Theſe feſtivities ſometimes continue three or four days, till the prieſt coming

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(A) This is a liquor made from maize by the following proceſs. The maize, after being ſoaked in water till it begin to grow, is dried in the ſun, then parched a little, and at laſt ground. The flour, after it has been well kneaded, is put with water into a large veſſel, and left for two or three days to ferment. Its taſte is nearly that of the moſt indifferent kind of cyder. It is a refreſhing, nouriſhing, and aperitive liquor; but it will not keep above eight days without turning ſour.

coming among them, throws away all the chicha, and obliges the Indians, leſt they ſhould procure more.

Their funerals are likewiſe ſolemnized with exceſſive drinking. The houſe is filled with jars of chicha, for the uſe of the mourners and other viſitors; the latter even go out into the ſtreets, and invite all of their nation who happen to paſs by to come in and drink to the honour of the deceaſed. This ceremony laſts four or five days, and ſometimes more, ſtrong liquor being their ſupreme enjoyment.

55 Their unaccountable marriages.

The Indians in the audience of Quito are ſaid to act contrary to all other nations in their marriages; for they never make choice of a woman who has not been firſt enjoyed by others, which they conſider as a certain indication of her perſonal attractions. After a young man has made choice of a woman, he aſks her of her father, and having obtained his conſent, the begin to cohabit together as man and wife, and aſſiſt the father-in-law in cultivating the land. At the end of three or four months, and frequently of a year, the huſband leaves his bride or wife without any ceremony; and perhaps expoſtulates with his father-in-law for endeavouring to deceive him, by impoſing upon him his daughter, whom nobody elſe had thought worthy of making a bedfellow. But if no diſguſt ariſes in the man on this account or any other, after paſſing three or four months in this commerce, which they call *amanarſe*, or to habituate one's ſelf, they then marry. This cuſtom is ſtill very common, though the whole body of the clergy have uſed all their endeavours to put a ſtop to it. Accordingly they always abſolve them of that ſin before they give them the nuptial benediction.

56 Temperature of the country in this province.

It has been obſerved, that the dependencies of the juriſdictions of Quito are ſeated between the two Cordilleras of the Andes, and that the air is more or leſs cold, and the ground more or leſs ſterile, according to the height of the mountains. Theſe barren tracts are called deſerts; for though all the Cordilleras are dry, ſome are much more ſo than others; and the continual ſnow and froſts render ſome parts of them incapable of producing a ſingle plant, and conſequently they are uninhabitable by man or beaſt.

Some of theſe mountains, which appear to have their baſes reſting on other mountains, riſe to a moſt aſtoniſhing height, and, reaching far above the clouds, are here, although in the midſt of the torrid zone, covered with perpetual ſnow. From experiments made with a barometer on the mountain of Cotopaxi, it appeared that its ſummit was elevated 6252 yards above the ſurface of the ſea, ſomething above three geographical miles, which greatly exceeds the height of any other mountain in the known world.

Cotopaxi became a volcano about the time when the Spaniards firſt arrived in this country. A new eruption happened in 1743, which had been for ſome days preceded by a continual interior rumbling noiſe; after which an aperture was made in its ſummit, as alſo three others near the middle of its declivity; theſe parts, when the eruption commenced, were buried under prodigious maſſes of ſnow. The ignited ſubſtances which were ejected being mingled with a conſiderable quantity of ſnow and ice, melting amidſt the flames, were carried down with ſuch amazing rapidity, that the plain from Callo to Latacunga was overflowed, and all the houſes with their wretched inhabitants were ſwept away in one general and indiſcriminate deſtruction. The river of Latacunga was the receptacle of this dreadful flood, till becoming ſwollen above its banks, the torrent rolled over the adjacent country, overturning or ſweeping away houſes and cattle, and rendered the land near the town of the ſame name as the river one vaſt lake. Here, however, the inhabitants had ſufficient warning to ſave their lives by flight, and retreated to a more elevated ſpot at ſome diſtance. During three days the volcano ejected cinders, while torrents of lava with melted ice and ſnow poured down the ſides of the mountain. The eruption continued for ſeveral days longer, accompanied with terrible roarings of the wind, ruſhing through the craters which had been opened. At length all was quiet, and neither ſmoke nor fire were to be ſeen; until in May 1744 the flames forced a paſſage through ſeveral other parts on the ſides of the mountain: ſo that in clear nights the flames, being reflected by the tranſparent ice, exhibited a very grand and beautiful illumination. On the 13th of November following, it ejected ſuch prodigious quantities of fire and lava, that an inundation equal to the former ſoon enſued, and the inhabitants of the town of Latacunga for ſome time gave themſelves over for loſt.

The moſt ſouthern mountain of the Cordilleras is that of Mecas or Sangay, which is of a prodigious height, and the far greateſt part of it covered with ſnow; yet from its ſummit iſſues a continual fire, attended with exploſions which are plainly heard at 40 leagues diſtance. The country adjacent to this volcano is entirely barren, being covered with cinders ejected from its mouth. In this mountain riſes the river Sangay, which being joined by the Upano, forms the Payra, a large river which diſcharges itſelf into the Maranon.

Pichincha, though famous for its great height, is 1278 yards lower than the perpendicular height of Cotopaxi, and was formerly a volcano, but the mouth or crater on one of its ſides is now covered with ſand and calcined matter; ſo that at preſent neither ſmoke nor fire iſſue from it. When Don George Juan and Don Antonio de Ulloa were ſtationed on it for the purpoſe of making aſtronomical obſervations, they found the cold on the top of this mountain extremely intenſe, the wind violent, and they were frequently involved in ſo thick a fog, or, in other words, a cloud, that an object at ſix or eight paces diſtance was ſcarcely diſcernible. The air grew clear, by the clouds moving nearer to the earth, and on all ſides ſurrounding the mountain to a vaſt diſtance, repreſenting the ſea with the mountain ſtanding like an iſland in the centre. When this happened, they heard the dreadful noiſe of the tempeſts that diſcharged themſelves on Quito and the neighbouring country. They ſaw the lightning iſſue from the clouds, and heard the thunder roll far beneath them. While the lower parts were involved in tempeſts of thunder and rain, they enjoyed a delightful ſerenity; the wind was abated, the ſky clear, and the enlivening rays of the ſun moderated the ſeverity of the cold. But when the clouds roſe, their thickneſs rendered reſpiration difficult: ſnow and hail fell continually, and the wind returned with all its violence; ſo that it was impoſſible entirely to overcome the fear of being, together with their hut, blown down the precipice on whoſe edge it was built, or of being buried in it by the conſtant accumulations of ice and ſnow. Their fears were likewiſe increaſed by the fall of enormous fragments of rocks. Though the ſmalleſt crevice viſible in their hut was ſtopped, the wind was ſo piercing that it penetrated through; and though the hut was ſmall, crowded with inhabitants, and had ſeveral lamps conſtantly burning, the cold was ſo great, that each individual was obliged to have a chafing-diſh of coals, and ſeveral men were conſtantly employed every morning to remove the ſnow which fell in the night. By the ſeverities of ſuch a climate their feet were ſwelled, and ſo tender that walking was attended with extreme pain, their hands covered with chilblains, and their lips ſo ſwelled and chopt that every motion in ſpeaking drew blood.

57 Province of Lima.

The next diviſion of Peru is the audience of Lima, which is bounded on the north by Quito, on the eaſt by the Cordilleras of the Andes, on the ſouth by the audience of Los Charcos, and on the weſt by the Pacific ocean, it being about 770 miles in length from north to ſouth, but of an unequal breadth.

58 Climate, ſoil, &c. in this province.

The climate and ſoil of this country is uncommonly various; in ſome places it is exceedingly hot, in others inſupportably cold, and in the city of Lima, where rain never falls, it is always temperate. The ſeaſons vary within the compaſs of a few miles, and in certain parts of the audience all the viciſſitudes of weather are experienced in 24 hours. It is extremely remarkable that no rains fall or rivers flow on the ſea coaſts, though the country is refreſhed by thick fogs, and the heat abated by denſe clouds that never condenſe into ſhowers. This phenomenon has drawn the attention of many naturaliſts, without their being able ſatisfactorily to account for it.

Spring begins toward the cloſe of the year, that is about the end of November or the beginning of December, when the vapours which fill the atmoſphere during the winter ſubſide, and the ſun, to the great joy of the inhabitants, again appears, and the country then begins to revive, which, during the abſence of his rays, had continued in a ſtate of languor. This is ſucceeded by ſummer, which, though hot from the perpendicular direction of the ſun's rays, is far from being inſupportable; the heat, which indeed would otherwiſe be exceſſive, being moderated by the ſouth winds, which always blow at this ſeaſon, though with no great force. Winter begins at the latter end of June or the beginning of July, and continues till November or December, when the ſouth winds begin to blow ſtronger, and to produce a certain degree of cold, not indeed equal to that in countries where ice and ſnow are known, but ſo keen that the light dreſſes are laid by, and cloth or other warm ſtuffs worn. During the winter the earth is covered with ſo thick a fog, as totally to intercept the rays of the ſun; and the winds, by blowing under the ſhelter of this fog, retain the particles they contracted in the frozen zone. In this ſeaſon only the vapours diſſolve into a very ſmall dew, which everywhere equally moiſtens the earth; by which means all the hills, which during the other parts of the year offer nothing to the ſight but rocks and waſtes, are clothed with verdure and enamelled with flowers of the moſt beautiful colours. Theſe dews never fall in ſuch quantities as to impair the roads or incommode the traveller; a very thin ſtuff will not ſoon be wet through; but the continuance of the miſts during the whole winter, without being exhaled by the ſun, fertilizes every part of the country.

From a table of meteorological obſervations made in the city of Lima, from the month of March 1791, to March 1792, it appears that the thermometer was loweſt during the month of September, when it deſcended to 62°, and that it was higheſt in the month of March, when it roſe as high as 84°. Theſe temperatures denote the extremes of heat and cold in the winter and ſummer of this climate.

Lima is as free from tempeſts as from rain; ſo that thoſe of the inhabitants who have neither viſited the mountains nor travelled into other parts, are abſolute ſtrangers to thunder and lightning, and are therefore extremely terrified when they firſt hear the former or ſee the latter. But it is very remarkable, that what is here entirely unknown ſhould be ſo common 30 leagues to the eaſt of Lima; it being no farther to the mountains, where violent rains and tempeſts of thunder and lightning are as frequent as at Quito.

But though the capital is freed from the terror of theſe tempeſts, it is ſubject to what is much more dreadful. Earthquakes happen here ſo frequently, that the inhabitants are under continual apprehenſions of being, from their ſuddenneſs and violence, buried in the ruins of their own houſes: yet theſe earthquakes, though ſo ſudden, have their preſages, one of the principal of which is a rumbling noiſe in the bowels of the earth about a minute before the ſhocks are felt, that ſeems to pervade all the adjacent ſubterraneous part; this is followed by diſmal howlings of the dogs, who ſeem to preſage the approaching danger. The beaſts of burden paſſing the ſtreets ſtop, and by a natural inſtinct ſpread open their legs, the better to ſecure themſelves from falling. On theſe portents the terrified inhabitants fly from their houſes into the ſtreets with ſuch precipitation, that if it happens in the night they appear quite naked; the urgency of the danger at once baniſhing all ſenſe of delicacy or ſhame. Thus the ſtreets exhibit ſuch odd and ſingular figures as might afford matter of diverſion, were it poſſible to be diverted in ſo terrible a moment. This ſudden concourſe is accompanied with the cries of children waked out of their ſleep, blended with the lamentations of the women, whoſe agonizing prayers to the ſaints increaſe the common fear and confuſion. The men are alſo too much affected to refrain from giving vent to their terror; ſo that the whole city exhibits a dreadful ſcene of conſternation and horror.

The earthquakes that have happened at the capital are very numerous. The firſt ſince the eſtabliſhment of the Spaniards was in 1582; but the damage was much leſs conſiderable than in ſome of the ſucceeding. Six years after Lima was again viſited by another earthquake, ſo dreadful, that it is ſtill ſolemnly commemorated every year. In 1609 another happened, which overturned many houſes. On the 27th of November 1630, ſuch prodigious damage was done in the city by an earthquake, that, in acknowledgement of its not having been entirely demoliſhed, a feſtival on that day is annually celebrated. Twenty-four years after, on the 3d of November, the moſt ſtately edifices in the city, and a great number of houſes, were deſtroyed by an earthquake; but the inhabitants retiring, few of them periſhed. Another dreadful one happened in 1678; but one of the moſt terrible was on the 20th of October 1687.

Peru.

1687. It began at four in the morning, and destroyed many of the finest public buildings and houſes, in which a great number of the inhabitants periſhed; but this was little more than a prelude to what followed; for two hours after, the ſhock returned with ſuch impetuous concuſſion, that all was laid in ruins, and the inhabitants felt themſelves happy in being only ſpectators of the general devaſtation, by having ſaved their lives, though with the loſs of all their property. During this ſecond ſhock, the ſea retiring conſiderably, and then returning in mountainous waves, entirely overwhelmed Callao, which is at five miles diſtance from Lima, and all the adjacent country, together with the miſerable inhabitants. From that time ſix earthquakes have happened at Lima previous to that of 1746. This laſt was on the 28th of October, at half an hour after ten at night, when the concuſſions began with ſuch violence, that in little more than three minutes the greateſt part, if not all the buildings in the city, were deſtroyed, burying under their ruins thoſe inhabitants who had not made ſufficient haſte into the ſtreets and ſquares, the only places of ſafety. At length the horrible effects of the firſt ſhock ceaſed; but the tranquillity was of ſhort duration, the concuſſions ſwiftly ſucceeding each other. The fort of Callao alſo ſunk into ruins; but what it ſuffered from the earthquake in its building was inconſiderable, when compared to the dreadful cataſtrophe which followed; for the ſea, as is uſual on ſuch occaſions, receding to a conſiderable diſtance, returned in mountainous waves, foaming with the violence of the agitation, and ſuddenly buried Callao and the neighbouring country in its flood. This, however, was not entirely effected by the firſt ſwell of the waves; for the ſea retiring farther, returned with ſtill greater impetuoſity, and covered both the walls and other buildings of the place; ſo that whatever had eſcaped the firſt inundation was totally overwhelmed by thoſe ſucceeding mountainous waves. Twenty-three ſhips and veſſels, great and ſmall, were then in the harbour, 19 of which were ſunk, and the other 4, among which was a frigate named St Fermin, were carried by the force of the waves to a conſiderable diſtance up the country. This terrible inundation and earthquake extended to other parts on the coaſt, and ſeveral towns underwent the ſame fate as the city of Lima; where the number of perſons who periſhed within two days after it began, amounted, according to the bodies found, to 1300, beſide the maimed and wounded, many of whom lived only a ſhort time in great torture. The preſent population of this city, taken from accurate ſources, amounts to 52,627.

The country of Lima enjoys great fertility, producing all kinds of grain and a prodigious variety of fruit. Here induſtry and art ſupply that moiſture which the clouds withhold. The ancient incas of Peru cauſed ſmall canals to be formed, in order to conduct the waters of the rivers to every part of the country. The Spaniards, finding theſe uſeful works executed to their hands, had only to keep them in order; and by theſe are watered ſpacious fields of barley, large meadows, plantations, vineyards, and gardens, all yielding uncommon plenty. Lima differs from Quito, where the fruits of the earth have no determined ſeaſon; for here the harveſt is gathered in, and the trees drop their leaves in the proper ſeaſon.

Although the ſummer here is hot, yet [illegible]tures are unknown, and the ſame may be ſaid of the territory called *Valles*, though here are ſome parts, as Tumbez and Piura, where the heat is almoſt as great as that of Guayaquil. This ſingularity can therefore proceed from no other cauſe than the natural drought of the climate.

39 Diviſions of the audience of Lima.

The audience of Lima is divided into four biſhoprics, Truxillo, Guamanga, Cuſco, and Arequipa. The dioceſe of Truxillo lies to the north of the archiepiſcopal dioceſe of Lima, and like all the others is divided into ſeveral juriſdictions. The city of Truxillo is ſeated in 8° 6′ ſouth latitude, in a pleaſant ſituation, though in a ſandy ſoil.

In the dioceſe of Guamanga is a rich quickſilver mine, from which the inhabitants of a neighbouring town procure their whole ſubſiſtence; the coldneſs of the air in that place checking the growth of all kinds of grain and fruit, ſo that they are obliged to purchaſe them from their neighbours. The quickſilver mines wrought here ſupply all the ſilver mines in Peru with that neceſſary mineral, and notwithſtanding the prodigious quantities already extracted, no diminution is perceived.

Cuſco, which gives name to another dioceſe, is the moſt ancient city of Peru, being of the ſame date with the empire of the incas, and was founded by them as the capital of the empire. On the mountain contiguous to the north part of the city are the ruins of a famous fort built by the incas; whence it appears that their deſign was to incloſe the whole mountain with a prodigious wall, of ſuch conſtruction as to render its aſcent abſolutely impracticable to an enemy, in order to prevent all approach to the city. This wall was entirely of freeſtone, and ſtrongly built, ſome of the ſtones being of a prodigious magnitude. The city of Cuſco is nearly equal to that of Lima. See CUSCO.

In this biſhopric are ſeveral mines of gold and ſilver, that are extremely rich.

The fourth dioceſe of the audience of Lima is Arequipa, which contains the city of the ſame name, one of the largeſt in Peru. It is delightfully ſituated in a plain; the houſes are well built of ſtone, and are generally lofty, commodious, finely decorated on the outſide, and neatly furniſhed within. The temperature of the air is extremely agreeable, the cold being never exceſſive, or the heat troubleſome; ſo that the fields are always clothed with verdure, and enamelled with flowers, as in a perpetual ſpring. But theſe advantages are allayed by its being frequently expoſed to dreadful earthquakes; for by theſe convulſions of nature it has been four times laid in ruins. The city is, however, very populous, and among its inhabitants are many noble families.

In this biſhopric are ſeveral gold and ſilver mines, and in ſome parts are large vineyards, from which conſiderable quantities of wine and brandy are made. Among the other productions is Guinea pepper, in which the juriſdiction of Arica in this dioceſe carries on a very advantageous trade, the annual produce of theſe plantations bringing in no leſs than 60,000 dollars per annum. The pods of this pepper are about a quarter of a yard in length, and when gathered are dried in the ſun and packed up in bags of ruſhes, each bag containing an aroba or a quarter of a hundred weight, and thus they are exported to all parts. Other places of its juriſdiction are famous for vaſt quantities of large and excellent olives, far exceeding the fineſt produced in Europe, being nearly, it is ſaid, the ſize of a hen's egg.

60 The audience of Charcas.

The audience of Charcas, the laſt diviſion of Peru, is equal in extent to that of Lima; but many of its parts are not ſo well inhabited, ſome being full of vaſt deſerts and impenetrable foreſts, while others have extenſive plains intercepted by the ſtupendous height of the Cordilleras: the country is inhabited only in ſuch parts as are free from thoſe inconveniences. It is bounded on the north by the dioceſe of Cuſco, and reaches ſouthward to Buenos Ayres; on the eaſt it extends to Braſil; and on the weſt it reaches to the Pacific ocean, particularly at Atacama. The remainder of the province borders on the kingdom of Chili.

61 Diviſions, &c. of this audience.

This audience is divided into the archbiſhopric of Plata, and five biſhoprics. We ſhall begin with the former.

The famous mountain of Potoſi is known all over the commercial world for the immenſe quantity of ſilver it has produced. The diſcovery of this amazing treaſure happened at the commencement of the year 1545, by a mere accident, which we ſhall mention afterwards. At a ſmall diſtance from it are the hot medicinal baths, called *Don Diego*, whither ſome reſort for health and others for amuſement.

62 How the country was at firſt ſettled by the Spaniards.

At the time when the firſt conqueſts were made, when emigrations were moſt frequent, the country of the Incas had a much greater reputation for riches than New Spain; and, in reality, for a long time much more conſiderable treaſures were brought away from it. The deſire of partaking of them muſt neceſſarily draw thither, as was really the caſe, a greater number of Caſtilians. Though almoſt all of them went over thither with the hope of returning to their country to enjoy the fortune they might acquire, yet the majority ſettled in the colony. They were induced to this by the ſoftneſs of the climate, the ſalubrity of the air, and the goodneſs of the proviſions. Mexico preſented not the ſame advantages, and did not give them reaſon to expect ſo much independence as a land infinitely more remote from the mother-country.

Cuſco attracted the conquerors in multitudes. They found this capital built on a ground that was very irregular, and divided into as many quarters as there were provinces in the empire. Each of the inhabitants might follow the uſages of his native country; but every body was obliged to conform to the worſhip eſtabliſhed by the founder of the monarchy. There was no edifice that had any grandeur, elegance, or convenience; becauſe the people were ignorant of the firſt elements of architecture. The magnificence of what they called the *palace of the ſovereign*, *of the princes of the blood*, and *of the great men of his empire*, conſiſted in the profuſion of the metals that were laviſhed in decorating them. The temple of the Sun was diſtinguiſhed above all other edifices; its walls were incruſted or ſheathed with gold and ſilver, ornamented with divers figures, and loaded with the idols of all the nations whom the Incas had enlightened and ſubdued.

As it was not a ſolicitude for their own preſervation which occupied the Spaniards at firſt, they had no ſooner pillaged the immenſe riches which had been amaſſed at Cuſco for four centuries, than they went in great numbers in 1534, under the order of Sebaſtian de Benalcazar, to undertake the deſtruction of Quito. The other towns and ſettlements of the empire were overrun with [illegible] of rapine; and the citizens and the temples were plundered in all parts.

Thoſe of the conquerors, who did not take up their reſidence in the ſettlements which they found already formed, built towns on the ſea coaſts, where before there were none: for the ſterility of the ſoil had not permitted the Peruvians to multiply much there; and they had not been induced to remove thither from the extremity of their country, becauſe they ſailed very little. Paita, Truxillo, Callao, Piſca, and Arica, were the roads which the Spaniards deemed moſt convenient for the communication they intended to eſtabliſh among themſelves and with the mother-country. The different poſitions of theſe new cities determined the degree of their proſperity.

Thoſe which were afterwards built in the inland parts of the country were not erected in regions which preſented a fertile ſoil, copious harveſts, excellent paſtures, a mild and ſalubrious climate, and all the conveniences of life. Theſe places, which had hitherto been ſo well cultivated by a numerous and flouriſhing people, were now totally diſregarded. Very ſoon they exhibited only a deplorable picture of a horrid deſert; and this wildneſs muſt have been more melancholy and hideous than the dreary aſpect of the earth before the origin of ſocieties. The traveller, who was led by accident or curioſity into theſe deſolate plains, could not forbear abhorring the barbarous and bloody authors of ſuch devaſtations, while he reflected that it was not owing even to the cruel illuſions of glory, and to the fanaticiſm of conqueſt, but to the ſtupid and abject deſire of gold, that they had ſacrificed ſo much more real treaſure, and ſo numerous a population.

This inſatiable thirſt of gold, which neither tended to ſubſiſtence, ſafety, nor policy, was the only motive for eſtabliſhing new ſettlements, ſome of which have been kept up, while ſeveral have decayed, and others have been formed in their ſtead. The fate of them all has correſponded with the diſcovery, progreſs, or declenſion, of the mines to which they were ſubordinate.

63 Manner of living of the natives.

Fewer errors have been committed in the means of procuring proviſions. The natives had hitherto lived hardly on any thing elſe but maize, fruits, and pulſe, for which they had uſed no other ſeaſoning except ſalt and pimento. Their liquors, which were made from different roots, were more diverſified: of theſe the chicha was the moſt uſual; but the conquerors were not ſatisfied either with the liquors or with the food of the people they had ſubdued. They imported vines from the Old World, which ſoon multiplied ſufficiently in the ſands of the coaſts at Ica, Piſca, Naſca, Moquequa, and Truxillo, to furniſh the colony with the wine and brandy it wanted. Olives ſucceeded ſtill better; and yielded a great abundance of oil, which was much ſuperior to that of the mother-country. Other fruits were tranſplanted with the ſame ſucceſs. Sugar ſucceeds ſo well, that none of any other growth can be compared to that which is cultivated in thoſe parts, where it never rains. In the inland country wheat and barley were ſown; and at length all the European quadrupeds were ſoon found grazing at the foot of the mountains.

This was a conſiderable ſtep; but there ſtill remained much more to be done. After they had provided for a better and a greater choice of ſubſiſtence, the next care of the Spaniards was to have a dreſs more commodious and more agreeable than that of the Peruvians. Theſe were, however, better clothed than any other American nation. They owed this ſuperiority to the advantage which they alone poſſeſſed, of having the LLAMA and PACOS, domeſtic animals which ſerved them for this uſe. See CAMELUS, MAMMALIA *Index*.

After the conqueſt, all the Indians were obliged to wear clothes. As the oppreſſion under which they groaned did not allow them to exerciſe their former induſtry, they contented themſelves with the coarſer cloths of Europe, for which they were made to pay an exorbitant price. When the gold and ſilver which had eſcaped the rapacity of the conquerors were exhauſted, they thought of re-eſtabliſhing their national manufactures. Theſe were ſome time after prohibited, on account of the deficiency which they occaſioned in the exports of the mother-country. The impoſſibility which the Peruvians found of purchaſing foreign ſtuffs and paying their taxes, occaſioned permiſſion to be given at the end of ten years for their re-eſtabliſhment. They have not been diſcontinued ſince that time; and have been brought to as great a degree of perfection as it was poſſible they could be under a continual tyranny.

64
anufac-
res, &c.

With the wool of the vicuna, a ſpecies of wild pacos, they make, at Cuſco and in its territory, ſtockings, handkerchiefs, and ſcarfs. Theſe manufactures would have been multiplied, if the ſpirit of deſtruction had not fallen on animals as well as on men. The ſame wool, mixed with that of the ſheep imported thither from Europe, which have exceedingly degenerated, ſerves for carpets, and makes alſo tolerably fine cloth. Fleeces of inferior quality are employed in ſerges, druggets, and in all kinds of coarſe ſtuffs.

The manufactures ſubſervient to luxury are eſtabliſhed at Arequipa, Cuſco, and Lima. In theſe three towns is made a prodigious number of gold toys and plate, for the uſe of private perſons, and alſo for the churches. All theſe manufactures are but coarſely wrought, and mixed with a great deal of copper. We ſeldom diſcover more taſte in their gold and ſilver laces and embroideries which their manufactures alſo produce. This is not altogether the caſe in regard to their lace, which, when mixed with that of Europe, looks very beautiful. This laſt manufacture is commonly in the hands of the nuns, who employ in it the Peruvian girls, and the young Meſtees of the towns, who for the moſt part before marriage paſs ſome years in the convent.

Other hands are employed in painting and gilding leather for rooms, in making with wood and ivory pieces of inlaid work and ſculpture, and in drawing figures on the marble that is found at Cucuca, or on linen imported from Europe. Theſe different works, which are almoſt all manufactured at Cuſco, ſerve for ornaments for houſes, palaces, and temples: the drawing of them is not bad, but the colours are neither exact nor permanent. If the Indians, who invent nothing, but are excellent imitators, had able maſters and excellent models, they would at leaſt make good copyiſts. At the cloſe of the laſt century, ſome works of a Peruvian painter, named *Michael de St Jacques*, were brought to Rome; and the connoiſſeurs diſcovered marks of genius in them.

65
Of the mines of gold and silver.

Though the Peruvians were unacquainted with coin, they knew the uſe of gold and ſilver; for they employed them in different kinds of ornaments. Independent of what the torrents and accident procured them of theſe metals, ſome mines had been opened of little depth. The Spaniards have not tranſmitted to us the manner in which theſe rich productions were drawn from the boſom of the earth. Their pride, which has deprived us of ſo much uſeful knowledge, undoubtedly made them think, that, in the inventions of a people whom they called *barbarous*, there was nothing that was worthy to be recorded.

The difference as to the manner in which the Peruvians worked their mines, did not extend to the mines themſelves. The conquerors opened them on all ſides. At firſt the gold mines tempted the avarice of the greater number. Fatal experience diſcouraged thoſe whom paſſion had not blinded. They clearly ſaw, that, for ſome enormous fortunes raiſed in this manner, great numbers, who had only moderate fortunes, were totally ruined. Theſe mines ſunk into ſuch diſcredit, that, in order to prevent them from being abandoned, the government was obliged to take the 20th part of their produce, inſtead of the fifth which it at firſt received.

The mines of ſilver were more common, more equal, and richer. They even produced ſilver of a ſingular ſpecies, rarely found elſewhere. Towards the ſea-coaſt, great lumps of this metal are found in the ſands.

There are a great number of other mines which are infinitely more important, and are found in the rocks and on the mountains. Several of them gave falſe hopes. Such, in particular, was that of Ucuntaya, diſcovered in 1713. This was only an incruſtation of almoſt maſſive ſilver, which at firſt yielded ſeveral millions, but was ſoon exhauſted.

Others which were deeper have been alike deſerted. Their produce, though equal to what it was originally, was not ſufficient to ſupport the expence of working them, which augmented every day. The mines of Quito, Cuſco, and Arequipa, have experienced that revolution which awaits many of the reſt.

There are greater numbers of very rich mines which the waters have invaded. The diſpoſition of the ground, which from the ſummit of the Cordilleras goes continually ſhelving to the South ſea, muſt neceſſarily render theſe events more common at Peru than in other places. This inconvenience, which with greater care and ſkill might often have been prevented or diminiſhed, has been in ſome inſtances remedied.

Joſeph Salcedo, about the year 1660, had diſcovered, not far from the town of Puna, the mine of Laycacota. It was ſo rich, that they often cut the ſilver with a chiſel. Proſperity had ſo elevated the mind of the proprietor, that he permitted all the Spaniards who came to ſeek their fortune in this part of the New World, to work ſome days on their own account, without weighing or taking any account of the preſents he made them. This generoſity drew around him an immenſe number of people, whoſe avidity made them quarrel with each other, and the love of money made them take up arms and fall upon one another; and their benefactor, who had neglected no expedient to prevent and extinguiſh their ſanguinary contentions, was hanged as being the author of them. Whilſt he was in priſon, the water got poſſeſſion of his mine. Superſtition ſoon made it imagined that this was a puniſhment for the horrid act they had perpetrated againſt him. This idea of divine vengeance was revered for a long time; but at laſt, in 1740, Diego de Baena aſſociated with other opulent people to divert the ſprings which had deluged ſo much treaſure. The labours which this difficult undertaking required, were not finiſhed till 1754. The mine yields as much now as it did at firſt. But mines ſtill richer than this have been diſcovered. Such, for example, is that of Potoſi, which was found in the ſame country where the Incas worked that of Porco.

An Indian, named *Hualpa*, in 1545, purſuing ſome deer, in order to climb certain ſteep rocks laid hold of a buſh, the roots of which were looſened from the earth, and brought to view an ingot of ſilver. The Indian had recourſe to it for his own uſe; and never failed to return to his treaſure every time that his wants or his deſires ſolicited him to it. The change that had happened in his fortune was remarked by one of his countrymen, and he diſcovered to him the ſecret. The two friends could not keep their counſel and enjoy their good fortune. They quarrelled; on which the indiſcreet confidant diſcovered the whole to his maſter, Villaroell, a Spaniard who was ſettled in the neighbourhood. Upon this the mine became known, and was worked; and a great number of them were found in its vicinity; the principal of which are in the northern part of the mountain, and their direction is from north to ſouth. The moſt intelligent people of Peru have obſerved, that this is in general the direction of the richeſt mines.

The fame of what was paſſing at Potoſi ſoon ſpread abroad; and there was quickly built at the foot of the mountain a town, conſiſting of 60,000 Indians and 10,000 Spaniards. The ſterility of the ſoil did not prevent its being immediately peopled. Corn, fruit, flocks, American ſtuffs, European luxuries, arrived there from every quarter. Induſtry, which everywhere follows the current of money, could not ſearch for it with ſo much ſucceſs as at its ſource. It evidently appeared that in 1738 theſe mines produced annually near 978,000l. without reckoning the ſilver which was not regiſtered, and what had been carried off by fraud. From that time the produce has been ſo much diminiſhed, that no more than one-eighth part of the coin which was formerly ſtruck is now made.

At the mines of Potoſi, and all the mines of South America, the Spaniards, in purifying their gold and ſilver, uſe mercury, with which they are ſupplied from Guança Velica. The common opinion is, that this mine was diſcovered in 1564. The trade of mercury was then ſtill free: it became an excluſive trade in 1571. At this period all the mines of mercury were ſhut; and that of Guança Velica alone was worked, the property of which the king reſerved to himſelf. It is now found to diminiſh. This mine is dug in a prodigiouſly large mountain, 60 leagues from Lima. In its profound abyſs are ſeen ſtreets, ſquares, and a chapel, where the myſteries of religion on all feſtivals are celebrated. Millions of flambeaux are continually kept to enlighten it.

Private people at their own expence work the mine of Guança Velica. They are obliged to deliver to government, at a ſtipulated price, all the mercury they extract from it. As ſoon as they have procured the quantity which the demands of one year require, the work is ſuſpended. Part of the mercury is ſold on the ſpot, and the reſt is ſent to the royal magazines throughout all Peru; from whence it is delivered out at the ſame price it is ſold for in Mexico. This arrangement, which has occaſioned many of the mines to drop, and prevented others from being opened, is inexcuſable in the Spaniſh ſyſtem. The court of Madrid, in this reſpect, merits the ſame reproaches as a miniſtry in other countries would incur, that would be blind enough to lay a duty on the implements of agriculture.

The mine of Guança Velica generally affects thoſe who work in it with convulſions: thoſe of the other mines, which are not leſs unhealthy, are all worked by the Peruvians. Theſe unfortunate victims of an inſatiable avarice are crowded together and plunged naked into theſe abyſſes, the greateſt part of which are deep, and all exceſſively cold. Tyranny has invented this refinement in cruelty, to render it impoſſible for any thing to eſcape its reſtleſs vigilance. If there are any wretches who long ſurvive ſuch barbarity, it is the uſe of cocoa that preſerves them.

In the Cordilleras, near the city of Paz, is a mountain of remarkable height, called *Illimani*, which doubtleſs contains immenſe riches; for a crag of it being ſome years ago ſevered by a flaſh of lightning, and falling on a neighbouring mountain, ſuch a quantity of gold was found in the fragments, that for ſome time that metal was ſold at Paz for eight pieces of eight *per* ounce; but its ſummit being perpetually covered with ice and ſnow, no mine has been opened in the mountain.

The city of La Paz is of a middling ſize, and from its ſituation among the breaches of the Cordilleras, the ground on which it ſtands is unequal, and it is alſo ſurrounded by mountains. When the river Titicaca is increaſed, either by the rains, or the melting of the ſnow on the mountains, its current forces along large maſſes of rocks with ſome grains of gold, which are found after the flood has ſubſided. Hence ſome idea may be formed of the riches incloſed in the bowels of theſe mountains; a remarkable proof of which appeared in the year 1730, when an Indian, waſhing his feet in the river, diſcovered ſo large a lump of gold, that the marquis de Caſtel Fuerte gave twelve thouſand pieces of eight for it, and ſent it as a preſent to the king of Spain.

In a period of ten years, the Peruvian mines, without including thoſe of Quito and Buenos Ayres, yielded 35,359 marks of gold, 22 carats fine, and 3,739,763 marks of ſilver. This has been eſtimated at 7,703,545l. ſterling. The above period is included between the years 1780 and 1790.

Balſam of PERU. See MYROXILON, BOTANY and MATERIA MEDICA *Index*.

PERUGIA, a town of Italy, in the pope's territories, and capital of Perugino. It is an ancient, handſome, populous, and large city, with a ſtrong citadel, an univerſity, and a biſhop's ſee. The churches, and many other buildings, as well public as private, are very handſome. It is ſeated on a hill, in E. Long. 12. 25. N. Lat. 43. 6.

PERUGINO, a province of Italy, in the territory of the church, bounded on the weſt by Tuſcany, on the ſouth by Orvietano, on the eaſt by the duchies of Spoleto and Urbino, and on the north by the territory of Citta Caſtellana. It is one of the ſmalleſt provinces in the territory of the church. The air is very pure, and the ſoil fertile in corn and good wine; beſides, the lake Perugia ſupplies them with plenty of fiſh. The capital town is Perugia. The lake is eight miles from the city, and is almoſt round, being about [illegible] miles in diameter; in it there are three iſlands. This province is about [illegible] miles in length, and near as much in breadth.

Perugino. See [illegible].

PERUKE. See Periwig.

PERUVIAN BARK. See Cinchona, and *Jeſuits Bark*, Materia Medica *Index*.

PERUVIANA, a general name given to that vaſt peninſula, extending itſelf from the Iſthmus of Darien to Cape Horn, in the form of a triangle, of which the *Terra Magellanica* and the cape form the vertex. It includes the whole of South America, though, as is well known, all the countries included within theſe limits are not ſubjected to the dominion of the crown of Spain. See *Terra Firma*.

PESARO, a town of Italy, in the territory of the pope, and duchy of Urbino, with a biſhop's ſee. It is a large place, whoſe ſtreets are paved with bricks. The caſtle is very well fortified, the harbour excellent, and the cathedral church magnificent. The environs are remarkable for producing good figs, of which they ſend large preſents to Venice. It is ſeated on an eminence at the mouth of the river Foglia, on the gulf of Venice. E. Long. 13. 0. N. Lat. 43. 56.

PESCARA, a very ſtrong town in the kingdom of Naples, and in the Hither Abruzzo; ſeated at the mouth of a river of the ſame name, which falls into the gulf of Venice. E. Long. 15. 2. N. Lat. 42. 27.

PESCENNIUS Niger. See Niger.

PESCHIERA, a ſmall but ſtrong town of Italy, in the Veroneſe, with a caſtle, and a ſtrong fort; ſeated on the river Mincio or Menzo, which proceeds from the lake Garda. E. Long. 11. 4. N. Lat. 45. 27.

PESENAS, an ancient town of France, in Languedoc, and in the dioceſe of Agde; delightfully ſeated on the river Pein, 12 miles north-eaſt of Beziers, and eight north of Agde. E. Long. 3. 34. N. Lat. 43. 28.

PESSARY, in *Medicine*, a ſolid ſubſtance compoſed of wool, lint, or linen, mixed with powder, oil, wax, &c. made round and long like a finger, in order to be introduced into the exterior neck of the matrix, for the cure of ſeveral uterine diſorders.

PEST, a town of Upper Hungary, and capital of a county of the ſame name, ſeated on the Danube, in a fine plain, over-againſt Buda, 85 miles ſouth-eaſt of Preſburg. E. Long. 18. 25. N. Lat. 47. 2[illegible].

PESTILENCE, in *Medicine*, the ſame with the Plague.

PETAGUEL, a territory of South America, in Braſil, bounded on the north by [illegible]; on the eaſt by the ſea; on the ſouth by the captainſhip of Rio Grande; and on the weſt by Tupuya. It contains mines of ſilver.

PETAL, in Botany, one of the coloured leaves which compoſe the flower.

PETALISM, [illegible] Greeks [illegible] To [illegible], therefore, the evils daily ariſing from thence, and to bring down the aſpiring tempers of the wealthy citizens, they enacted a law, much reſembling that of the Athenian oſtraciſm; for as at Athens every citizen was to write upon a ſhell the name of the perſon whom they conceived to be the moſt likely, on account of his wealth and intereſt, to aſpire to the crown; ſo at Syracuſe they were to write on a leaf the names of ſuch as they apprehended powerful enough to uſurp the ſovereignty. When the leaves were counted, he who had the moſt ſuffrages againſt him was, without any further inquiry, baniſhed for five years. This new-contrived method of [illegible] the citizens, and weakening the intereſt of the overgrown citizens, was called *petaliſm*, from the Greek word *πεταλον*, which ſignifies "a leaf." This law was attended with many evil conſequences; for thoſe who were moſt capable of governing the commonwealth were driven out, and the adminiſtration of public affairs committed to the meaneſt of the people; nay, many of the chief citizens, who were able to render their country great ſervices, fearing to fall under penalties of this law, withdrew from the city, and lived private in the country, not concerning themſelves with public affairs: whence all the employments being filled with men of no merit or experience, the republic was on the brink of ruin, and ready to fall into [illegible] anarchy and confuſion. The law therefore of petaliſm, upon more mature deliberation, was repealed ſoon after it had been firſt enacted, and the reins of government were again put into the hands of men who knew how to manage them.

PETARD, in the art of war. See Gunnery.

PETAU, Denis, or *Dionyſius* PETAVIUS, a French Jeſuit of great erudition, was born at Orleans in 1583. His father was a man of literature, and obſerving ſtrong parts and an excellent genius for letters in his ſon, he took every means in his power to improve them. He uſed to tell his ſon, that he ought to qualify himſelf ſo, as to be able to attack and confound "the giant of the Alphabet;" meaning that moſt eminent ſcholar Joſeph Scaliger, whoſe abilities and learning were allowed to have done great honour and much ſervice to the reformed. Young Petavius ſeems to have entered readily into his father's views; for he ſtudied moſt intenſely, and afterwards levelled much of his erudition againſt Scaliger. He joined the ſtudy of the mathematics to that of the belles lettres; and afterwards applied himſelf to a courſe of philoſophy, which he began in the college of Orleans, and finiſhed at Paris. He afterwards maintained theſes in Greek, which was as familiar to him as Latin; and the Latin, it is ſaid, he underſtood better than he did his own native language. When he was pretty well advanced, he had free acceſs to the king's library, which he often viſited on account of the Latin and Greek manuſcripts. Among other advantages which accompanied his literary purſuits, was the friendſhip of Iſaac Caſaubon, whom Henry IV. called to Paris in 1600. It was at Caſaubon's inſtigation, that Petavius, though then

Petavius.

when very young, undertook an edition of The Works of Synefius. In this edition he corrected the Greek from the manufcripts, tranflated that part which yet remained to be tranflated into Latin, and wrote notes upon the whole. He was but 19 years of age when he was made profeffor of philofophy in the univerfity of Bourges; and he fpent the two following years in ftudying the ancient philofophers and mathematicians. In 1604, when Morel, profeffor of Greek at Paris, publifhed The Works of Chryfoftom, fome part of Petavius's notes on Synefius were added to them: from the title of which we learn, that he then took the name of *Petit*, which he afterwards changed into *Petavius*. His own edition of The Works of Synefius did not appear till 1612.

He entered into the fociety of the Jefuits in 1605, and did great credit to it by his vaft and profound erudition. He became a zealous advocate for the church of Rome; and there was no way of ferving it more agreeable to him than that of criticifing and abufing its adverfaries. He was moft bitter againft Scaliger; nor did he even fpare his friend Cafaubon whenever he came in his way.—Petavius excelled particularly in the dark fcience of chronology; the learned world in general being obliged to him for fome exact and nice difquifitions on this fubject. His chief work, which is in great repute to this day, he intitled, *Rationarium Temporum*. It is an abridgement of univerfal hiftory, from the earlieft times to 1632, in chronological order, with references to proper authorities. It was improved, and feveral additions made to it, by Perizonius, and others after his death. This eminent father, after a very laborious life, died at Paris in the end of the year 1652, aged 69. Gaffendus, in his life of Peirefkius, fays he was the moft confummate fcholar the Jefuits ever had: an opinion very likely to be true, when we confider that he often contended fuccefsfully with Scaliger, Salmafius, and others, whofe abilities have been univerfally acknowledged. His judgement, however, was not equal to his erudition, and his controverfial writings are full of fournefs and fpleen. We have the following character of a great work of Petavius by an author of much celebrity, but who perhaps is as much biaffed on the fide of infidelity as he thinks this learned Jefuit was in favour of the church of Rome. The *Dogmata Theologica* of Petavius are a work of incredible labour and compafs: the volumes which relate folely to the incarnation (two folios, 5th and 6th, of 837 pages) are divided into 16 books—the firft of his hiftory, the remainder of controverfy and doctrine. The Jefuit's learning is copious and correct; his Latinity is pure, his method clear, his argument profound and well connected; but he is the flave of the fathers, the fcourge of heretics, and the enemy of truth and candour, as often as they are inimical to the Catholic caufe.

PETAW, an ancient town of Germany, in the circle of Auftria, and in Stiria. It is a handfome place, and is feated on the river Drave, 35 miles north-eaft of Cilley, and 109 fouth of Vienna. E. Long. 15. 36. N. Lat. 46. 40.

PETCHELI, a province of Afia, in China, and the chief in the whole empire; bounded on the eaft by the fea, on the north by the great wall, on the weft by Chanfi, and on the fouth by Chantong and Honan. "This province contains nine cities of the firft clafs, which have feveral others under their jurifdiction; thefe are about 40 in number, lefs confiderable indeed, but all furrounded with walls and ditches. Petcheli has few mountains. Its foil is fandy, and produces very little rice; but all other kinds of grain abound there, as well as the greater part of the fruit-trees we have in Europe. It pays an annual tribute to the emperor, which, according to Father Martini, confifts of 601,153 bags of rice, wheat, and millet; 224 pounds of linfeed; 45,135 of fpun filk; 13,748 of cotton; 8,737,248 truffes of ftraw for the horfes belonging to the court, and 180,870 meafures of falt, each containing 124 pounds; which is proportionably much inferior to that paid by other provinces. The population of this province is eftimated at 38,000,000.

Petcheli.

"It is remarked that the people of this province have not the fame aptitude for acquiring the fciences as thofe who inhabit the fouthern provinces of the empire; but they are more robuft and warlike; and better calculated to endure the hardfhips and fatigue of war. This is the cafe with the Chinefe of all the other northern countries.

"The face of the country here being flat and level, permits the ufe of a kind of carriage, the conftruction of which appears to be rather fingular. Father Martini, one of the firft miffionaries in China, thus defcribes it: 'They ufe, in the province of Petcheli, a kind of chariot with one wheel, and conftructed in fuch a manner, that there is room in the middle for only one perfon, who fits as if on horfeback; the driver pufhes behind, and, by means of wooden levers, makes the chariot advance with fafety and expedition. This has perhaps given rife to the report of chariots driven in that country by the wind, which the Chinefe direct over land with fails, as they do fhips at fea. A French miffionary, who traverfed this province in 1768, feems to have made ufe of the fame kind of carriage. 'We quitted the canal (fays he) to travel in carts, which is cuftomary in this part of China; but it is difagreeable beyond defcription. The cart is amazingly clumfy, and has a great refemblance to the carriage of a gun: there is room in it for only one perfon, who is frequently obliged to fit crofs-legged, as our taylors do in Europe; it jolts prodigioufly; and, while the traveller is expofed to the fcorching rays of the fun, fuch clouds of duft fometimes arife as almoft fuffocate him.'

"The temperature of the air of this province does not feem to agree with its latitude. Although Petcheli extends no farther than to the 42d degree of north latitude, yet all the rivers there are fo much frozen during four months in the year, that horfes and waggons with the heavieft loads may fafely pafs them. It deferves to be remarked, that the whole body of ice is formed in one day, and that feveral are neceffary to thaw only the furface. What may appear no lefs extraordinary is, that during thefe fevere frofts one does not feel that fharp and pinching cold which accompanies the production of ice in Europe. Thefe phenomena cannot be accounted for, but by attributing them to the great quantity of nitre which is found difperfed throughout this province, and to the ferenity of the fky, which, even during winter, is feldom obfcured by a cloud. The phyfical explanation, which we have given of this fingular temperature, is fully confirmed by experiments lately made by Father Amiot at Peking, which convinced him, that in this capital and neighbourhood, as far as feven or eight

Petcheli. eight leagues around, the water, air, and earth, equally abound with nitre.

"With regard to the water, the facility with which it freezes, the solidity of the ice and its duration, evidently announce the presence of nitre. A tub filled with water, placed near one of Reaumur's thermometers, had its surface immediately frozen, when the mercury stood only one degree above the freezing point; and when it stood three degrees below freezing, the water became a hard mass of ice, if the diameter of the vessel did not exceed a foot and a half, and the depth of the water four or five inches. This water, when the weather was fine, continued in the same state of congelation as long as the mercury in the thermometer did not rise higher than three degrees above 0; when the mercury rose higher, it then began to dissolve, but so slowly, that two or three days were scarcely sufficient to restore it to its former fluidity." Crosier goes on to relate other experiments of Father Amiot, which were made with a view to discover the cause of the water's freezing so in this temperate climate; and he then proceeds to tell us, that "if the waters of the province of Petcheli contain much nitre, it is no less certain, that the air which one breathes there is abundantly impregnated with it. The following are indubitable proofs of it: 1st, Notwithstanding unwholesome food, such as the flesh of the greater part of domestic animals that have died of old age or disease, which the people of this province greedily devour, notwithstanding filth and all the inconveniences resulting from low, damp, and confined lodgings, where all the individuals of the same family are, as it were, heaped one upon another, the plague never makes its appearance in Petcheli; and the people are seldom attacked by any of those epidemical distempers which are so common in Europe. 2dly, Provisions of every kind may be kept at Peking a long while, without being subject to corruption. Raisins are eaten there fresh even in May, apples and pears till midsummer; wild boars, stags, deer, roebucks, rabbits, hares, pheasants, ducks, geese, and all kinds of game, brought from Tartary to Peking after the commencement of winter; fish of every species, transported from the rivers of Leaotong—will keep without the assistance of salt, in their state of congelation, for two or three months, although they are exposed every day in the markets, carried from the markets to private houses, and from private houses brought back to the markets until they are all sold, which does not happen before the end of March. It is certain that these facts announce an antiseptic quality in the air, which must undoubtedly proceed from the great quantity of nitre contained in it.

"3dly, The earth which forms the soil of Petcheli abounds no less with nitre; whole fields may be seen in the neighbourhood of Peking which are covered with it. Every morning at sunrise, the country in certain cantons appears white as if sprinkled by a gentle fall of snow. If a quantity of this substance be swept together, a great deal of kien, nitre, and salt, may be extracted from it. The Chinese pretend that this salt may be substituted for common salt; however this may be, it is certain, that, in the extremity of the province towards Siuen-hoa-fou, poor people, and the greater part of the peasants, make use of no other. With regard to the kien procured from the earth, they use it for washing them as we do soap. Although the land of Petcheli is [illegible] replete with nitrous particles, it does not, however, form dry deserts; it is covered with corn, and rendered fruitful by [illegible]. The canals are frozen in winter to the depth of two or three feet, and they are become fluid before the end of March. This long congelation [illegible] places in the neighbourhood of Peking, which [illegible] in Sweden, although it is 22 degrees farther south than the capital of that kingdom."

PETECHIÆ, in Medicine, a name given to small spots [illegible] fevers, which [illegible] in petechial fevers.

PETELIA. See STRONGOLI.

Peter. PETER, St, the apostle, born at Bethsaida, was son of John, Jona, or Joana, and brother of St Andrew (John i. 42. 43.). His first name was Simon or Simeon; but when our Saviour called him to the apostleship, he changed his name into Cephas, that is, in Syriac, a *stone* or a *rock*; in Latin *petra*, whence *Peter*. He was a married man; and had his house, his mother-in-law, and his wife, at Capernaum upon the lake of Gennesareth (Mark i. 29. Matth. viii. 14. Luke iv. 38.). St Andrew having been first called by Jesus Christ, met his brother Simon, and told him (John i. 41.) we have found the Messiah, and then brought him to Jesus. Jesus beholding him, said to him, You are Simon son of John; henceforth you shall be called Cephas, that is, *stone* or *rock*. After having passed one day with our Saviour, they returned to their ordinary occupation, which was fishing. Yet it is thought they were present with him at the marriage of Cana in Galilee. This happened in the 30th year of the vulgar Christian era.

Towards the end of the same year, Jesus Christ being on the shore of the lake of Gennesareth, saw Peter and Andrew busy about their fishery, and washing their nets, (Luke v. 1, 2, 3.). He entered into their boat, and bid Peter throw out his nets into the sea, in order to fish. Peter obeyed him, though he had already fished the whole night without catching any thing. They took so many fishes at this draught, that their own vessel, and that of James and John, sons of Zebedee, were filled with them. Then Peter threw himself at the feet of Jesus, and said to him, Depart from me, Lord, for I am a sinner. Then Jesus said to them, Follow me, and I will make you fishers of men. He said the same thing to James and John; and immediately they quitted their boats and nets, and followed our Saviour.

Some time after, Jesus coming to Capernaum entered into the house of St Peter, whose mother-in-law lay sick of a fever. He immediately healed her, and she began to minister to him (Luke iv. 38. and Mat. viii. 14.). A little while before the feast of the passover of the following year, being the 32d of the vulgar era, after Jesus returned into Galilee, he made choice of twelve apostles, among which St Peter has always the first place (Mat. x. 2. Luke vi. 13.). One night when Jesus Christ walked upon the waters of the lake of Gennesareth, St Peter asked him leave to come and meet him (Mat. xiv. 28, 29.). Jesus gave him leave; but he seeing a great wave coming, was afraid, and therefore began to sink. Then Jesus held him up, and said, O thou of little faith, why was you afraid? Afterwards landing on the other ſide of the lake, and the multitude that he had fed the day before beyond the lake being come to him at Capernaum, he ſpoke to them of his body and of his blood which he was to give to his diſciples to eat and drink. This ſo offended the multitude, that ſeveral of them quitted him thereupon. He therefore aſked his apoſtles if they alſo would leave him; to which Peter replied, To whom ſhall we go, Lord; for thou haſt the words of eternal life (John vi. 53, 54, &c.). One day, as our Saviour was near Cæſarea Philippi, he aſked his apoſtles whom the world took him for? they anſwered, that ſome ſaid he was John the Baptiſt; others, Elias; and others Jeremiah, or one of the prophets. But whom do you ſay I am? ſays Jeſus Chriſt. Simon Peter anſwered, Thou art Chriſt, the ſon of the living God. Jeſus then ſaid unto Peter, Bleſſed art thou, Simon Barjona; for fleſh and blood hath not revealed it unto thee, but my father which is in heaven (Mat. xvi. 13, 14, &c.). And I ſay unto thee, that, as thou art Peter, ſo upon this rock will I build my church, and the gates of hell ſhall not prevail againſt it; and I will give unto thee the keys of the kingdom of heaven, and whatſoever thou ſhalt bind on earth ſhall be bound in heaven, and whatſoever thou ſhalt looſe upon earth ſhall be looſed in heaven. About ſix or eight days after this, our Saviour taking Peter, James, and John, up a high mountain, apart from the other diſciples, ſhowed them a glimpſe of his glory, and was transfigured before them (Mat. xvii. 1, 2, &c. and Luke ix. 28.). Whereupon Peter, ſeeing Moſes and Elias together with Jeſus, cried out to them in an ecſtacy, Lord, it is good for us to be here! if you pleaſe, we will make three tents; one for you, one for Moſes, and one for Elias.

Jeſus returning from thence to Capernaum, thoſe who gathered the tribute-money came to Peter, and ſaid, Does not your maſter pay tribute? Whereupon Jeſus ordered Peter to throw his line into the ſea, and that he ſhould find wherewith to pay the toll for them two in the mouth of the firſt fiſh he ſhould take. Peter obeyed; and finding a piece of money in the mouth of the fiſh, he gave it to the tribute gatherers, as he was directed. One day, as Jeſus was diſcourſing concerning the forgiveneſs of injuries (Mat. xviii. 21, 22.), St Peter aſked him, how often they muſt forgive, and whether it was ſufficient to pardon an offender ſeven times? Jeſus told him, I ſay, you muſt pardon not only as far as ſeven times, but even ſeventy-times ſeven. Upon another occaſion (Mat. xix. 27—29.), as our Saviour was ſpeaking of the danger of riches, Peter ſaid to him, Lord, we have left all things to follow thee; what reward ſhall we have for it? Jeſus anſwered him, I tell you in truth, that you who have left all things to follow me ſhall receive an hundred fold even in this world, and in the other eternal life; and at the laſt day, when the Son of man ſhall come to judge the world, you ſhall ſit upon twelve thrones to judge the twelve tribes of Iſrael.

On the Tueſday before our Saviour's paſſion, Peter ſhowed him the fig-tree he had curſed the evening before, which was now dried up and withered (Mark xi. 12—21.); and the day following, as they ſat upon the mountain of Olives, he, with the other apoſtles, aſked Jeſus when the temple was to be deſtroyed (Mat. xxiv. 1, 2, &c. Mark xiii. 1, 2, &c. Luke xxi.). On Thurſday he was ſent with St John to prepare all things for the paſſover; and at evening, when Jeſus was come into the city with his apoſtles, and, being ſet down at table, began to ſpeak of him that ſhould betray him, Peter made ſigns to John to aſk him who this ſhould be (John xiii. 24.). After ſupper, the diſciples entered into diſpute which ſhould be the greateſt among them: whereupon Jeſus Chriſt, laying aſide his garments, betook himſelf to waſh their feet, to give them an example of humility in his own perſon. St Peter at firſt made ſome difficulty, and would not ſuffer his maſter to waſh his feet: but Jeſus telling him, that if he did not waſh his feet, he could have no part in him; St Peter replied, Lord, waſh not only my feet, but my hands and head alſo (John xiii. 6—10.).

Some time after, Jeſus ſaid to him (Luke xxii. 31, 32, &c.), Peter, Satan has deſired to ſift you as men ſift wheat; but I have prayed for you, that your faith may not fail: and when you are converted, confirm your brethren. By this he warned St Peter of his fall, that was juſt at hand, and of his renouncing him; from which, by the aſſiſtance of God, he was afterwards to recover. St Peter then aſked him, where he was going? and ſaid, he was ready to follow him everywhere, not only to priſon, but to death itſelf. But Chriſt declared to him, that he would be ſo far from following him to death that he would abjure him three times that very night before the cock ſhould crow, or before break of day. When ſupper was ended, he went to the garden of Olives, where, taking Peter, James, and John, he went with them apart, that they might be witneſſes of his agony. Peter, though before he had ſhowed ſo much reſolution, yet fell aſleep with the reſt; which occaſioned Jeſus to ſay to him, Do you ſleep, Simon? Could you not watch with me one hour? (Mark xiv. 37. Mat. xxvi. 40, &c.).

Judas being come with the ſoldiers to ſeize Jeſus, Peter drew his ſword, and cut off the right ear of one called Malchus, who was ſervant to the high-prieſt: but Jeſus bid him put up his ſword into the ſcabbard, and told him, that all thoſe who fought with the ſword ſhould periſh by the ſword: and at the ſame time healed Malchus's ear (John xviii. 10, &c.). Peter followed Jeſus afar off, as far as the houſe of Caiaphas, and was let in by means of another diſciple, who was known in the family. The ſoldiers and ſervants that had brought Jeſus, having lighted a fire in the middle of the hall, Peter mingled among them to warm himſelf alſo; when a maid-ſervant, having looked earneſtly upon him, ſaid, Surely this man was with Jeſus of Nazareth. But Peter made anſwer, I know not what you ſay, for I do not ſo much as know the man. Preſently after he went out into the porch, when immediately the cock crew. A little while after another maid ſaid to thoſe that were preſent, This man was with Jeſus of Nazareth. But Peter denied it with an oath. About an hour after, one of the company affirmed that Peter was a diſciple of Jeſus. Others inſiſted upon the ſame thing; and ſaid, that ſurely he was one of them, for his very ſpeech betrayed him to be a Galilean. Laſtly, one of them, being a kinſman of Malchus whoſe ear Peter had cut off, affirmed the ſame thing; and aſked him, Did not I ſee you with him in the garden? Peter again denied it with an oath, proteſting that he did not know the man. And at the ſame time the cock crowed the ſecond time:

Peter. time. Then Jeſus, being in the ſame hall, and not far from Peter, looked upon him; and Peter then remembering what Jeſus had ſaid to him, that before cock-crow he ſhould deny him thrice, he went out of Caiaphas's houſe, and wept bitterly (Mat. xxvi. 73, 75. Mark xiv. 34, 72.).

Very probably he remained in ſecret, and in tears, all the time of our Saviour's paſſion, that is, all Friday and Saturday following; but on Sunday morning, Jeſus being riſen, and Mary having been at the tomb, and not finding the body of Jeſus, ſhe came in haſte into the city, to tell Peter and John that they had taken away their maſter, and that ſhe could not find where they had put him. Peter and John made haſte thither, and John coming firſt, did not go into the ſepulchre. Peter then coming up to him, preſently ſtooped down, and ſaw the linen clothes wherein the body had been wrapt. He went then into the ſepulchre, and John with him; after which they returned to Jeruſalem, not knowing what had come to paſs. But ſoon after Jeſus appeared to the holy women, who had come firſt to the ſepulchre, and bid them give his apoſtles notice of his reſurrection. And the ſame day our Saviour alſo appeared to Peter, to comfort him, and aſſure him that his repentance had been acceptable to him.

Some days after, St Peter being returned into Galilee as Jeſus had commanded him, and going to fiſh in the ſea of Galilee, or in the lake of Genneſareth, with ſome other of the apoſtles, Jeſus appeared to them on the ſhore, and bid them throw out their nets on the right ſide of the veſſel. They threw them out, and took ſuch a multitude of fiſhes that they could not draw up their nets again. Then St John ſaid to Peter, It is the Lord. Peter immediately girded up himſelf, for he was naked, and ſwimming to ſhore he came to Jeſus: then drawing their nets to ſhore, Jeſus dined with them. After dinner, Jeſus, ſaid to Peter, Simon, ſon of Jona, do you love me more than theſe? He anſwered, Yea, Lord, you know that I love you. Jeſus ſays to him, Then feed my lambs. He put the ſame queſtion to him again; and Peter making the ſame anſwer, our Lord ſaid to him again, Feed my ſheep. This he repeated a third time; at which St Peter was troubled, and ſaid, You know, Lord, that I love you. Jeſus replied to him, "Feed my ſheep. I tell you for a truth, that when you were young, you girded yourſelf, and went where you pleaſed; but now you are old, another ſhall gird you, and lead you where you would not go." This he ſaid to let him know what death he was to die. At the ſame time, Peter ſeeing St John the Evangeliſt, ſaid to our Saviour, Lord, what muſt become of him? Jeſus anſwered, "If I will that he tarry till I come, what does that concern you? Do you follow me." Thus he refuſed to declare in what manner St John ſhould end his life.

After that Jeſus Chriſt had aſcended into heaven, and that the apoſtles had been witneſſes of his aſcenſion, they returned to Jeruſalem, to wait there for the Holy Ghoſt, whom our Saviour had promiſed to ſend them; and being aſſembled together in a body, they continued there in prayer, and in the union of charity, till the time that the Holy Ghoſt deſcended upon them, in the form of tongues of fire. During this interval, St Peter propoſed to the apoſtles, and to the reſt of the aſſembly, to fill up the place that the traitor Judas had left vacant in the apoſtleſhip. The propoſal was agreed to by all; and two perſons were propoſed, Joſeph Barſabas and Matthias: upon this laſt the lot fell; and from that time he was admitted one of the apoſtles. The tenth day after the aſcenſion of our Saviour, being the day of Pentecoſt, the Holy Ghoſt having deſcended upon the apoſtles, and upon all the faithful that were aſſembled with them, and having repleniſhed them with ſupernatural gifts, and eſpecially with the gift of tongues, all thoſe who were witneſſes of this miracle expreſſed their admiration at it; and there being at that day at Jeruſalem a great many Jews from ſeveral provinces of the eaſt, they could not comprehend by what means theſe men, who were Galileans, ſhould ſpeak the languages of all theſe foreign nations (Acts ii. 1, 2, &c.). Some of them ſaid, that the apoſtles were full of new wine. But St Peter ſtanding up, told them, that what they heard and ſaw was not the effect of drunkenneſs, but was the completion of the promiſe that the Holy Ghoſt had made by the prophet Joel (ii. 28.), to ſend his ſpirit upon all fleſh, and to give the ſpirit of prophecy to young and old, to men and women. He afterwards ſpoke to them of Jeſus Chriſt, and told them that he was the true Meſſiah, that he was riſen from the dead as the ſcripture had foretold he ſhould; declaring that himſelf and the other apoſtles were witneſſes of his reſurrection; of his aſcenſion into heaven, and of the miſſion of the Holy Ghoſt, the viſible effects of which they ſaw with their own eyes in the gifts of languages wherewith they had been repleniſhed.

Then thoſe that heard him were touched with compunction, and aſked the apoſtles, Brethren, what ſhall we do? Peter anſwered them, Repent, and be baptized, and you ſhall receive the Holy Ghoſt. Then he inſtructed them, baptized them, and that very day three thouſand perſons were added to the church (Acts iii. 1, 2, &c.). Some days after, St Peter and John, going to the temple at the hour of prayers, met at a gate of the temple a man who had been lame from his birth, ſo that he was carried about. This man ſeeing Peter and John, aſked alms of them: upon which Peter ſaid to him, Silver or gold I have not; but ſuch as I have I give thee: In the name of Jeſus of Nazareth, riſe up and walk. Preſently the man got up, and went into the temple along with them, lifting up his voice, and glorifying God. He held St Peter, telling the people then aſſembled all that had happened unto him. Then Peter, taking this occaſion, told the people, that it was not by his own power that he had performed the miracle they ſo much wondered at, but that it was by the power of Jeſus Chriſt that this man was healed. He then laid before them the great crime they had committed, in putting Jeſus Chriſt to death, who was the Saviour of the world, and the Meſſiah; and after he had ſhown them by all the prophecies that Chriſt was to die thus, he exhorted them to repentance, and to make a proper uſe of the death of Chriſt.

He was thus ſpeaking to the people, when the prieſts and Sadducees coming upon them, laid hold on Peter and John, and put them in priſon, until the day following, it being now late (Acts iv. 1, 2, &c.). But the number of thoſe that were converted this day at the ſecond preaching of St Peter was about five thouſand. The day following, the rulers, the elders, and chief prieſts being aſſembled on this occaſion, ordered the apoſtles to be brought before them; and then aſked them, by whoſe authority they performed the miracle of healing the lame man? St Peter anſwered, that it was in the name of Jeſus of Nazareth, whom they had crucified, and whom God raiſed again from the dead. The aſſembly were ſurpriſed at the boldneſs of the apoſtles upon this occaſion: but came to a reſolution to diſmiſs them, charging them at the ſame time to teach no more in the name of Jeſus; and threatening them if they ſhould perſiſt in diſobedience to theſe orders. The two apoſtles returned to their brethren, and related to them all that had paſſed; which having heard, the brethren raiſed their voices to heaven, begging God to give them ſtrength and courage to declare his word with perfect liberty; and having finiſhed their prayers, the place ſhook wherein they were aſſembled, and they were again filled with the Holy Ghoſt.

At this time many of the faithful ſold their eſtates, and brought the money to the apoſtles (*id.* v. 1, 2, &c.). Of this number was a man called Ananias, with his wife Sapphira, who, by a private agreement between themſelves, concealed a part of the money for which they had ſold their land, and brought the reſt to St Peter, as if it were the whole ſum. Ananias came firſt; and St Peter ſaid to him, Ananias, how came Satan to ſeduce you, and to prevail with you to lie to the Holy Ghoſt, by concealing part of the price of your land? It is not men that you thought to impoſe on, but God. Immediately Ananias fell down dead, and they carried him out and buried him. About three hours after his wife Sapphira came in, and St Peter ſaid to her almoſt the ſame things he had before ſaid to her huſband, and immediately ſhe fell down alſo, and gave up the ghoſt. This affair infuſed a great awe in the whole church, and amongſt all thoſe that heard of it. (See Acts v.).

The number of believers conſiderably increaſed every day: ſo that they even brought out the ſick into the ſtreets, and laid them where Peter was to paſs, that at leaſt his ſhadow might cover ſome of them, by which means they were healed of their diſtempers. Then the high-prieſt and his aſſociates, that is, the Phariſees, cauſed the apoſtles to be apprehended and put into priſon. But an angel brought them forth, and bid them go into the temple, and there boldly declare all the words of life which God had taught them. This they performed: upon which the princes and prieſts cauſed them to be brought before them; and having demanded why they had diſobeyed their orders, in continuing to ſpeak ſtill in the name of Jeſus Chriſt, Peter and the apoſtles anſwered, that it was more neceſſary to obey God than man. This anſwer provoked them very much, and they were going to condemn them to death, when Gamaliel prevailed with them to change their reſolution, by repreſenting to them, that if this matter proceeded from God, it was in vain for them to oppoſe it; but if otherwiſe, then it ſhould ſoon vaniſh of itſelf. So they diſmiſſed the apoſtles, after giving them 39 ſtripes apiece, and charged them to ſpeak no more in the name of Jeſus Chriſt.

After the martyrdom of St Stephen, a perſecution was carried on againſt the faithful at Jeruſalem, and they were obliged to take ſhelter in ſeveral places. The apoſtles alone continued at Jeruſalem (Acts viii. 1, 2, 3, &c.). St Philip the deacon going to Samaria, the Samaritans received the word of the Lord, and ſeveral of them were baptized. Then St Peter and St John repaired thither alſo, to give them the Holy Ghoſt; which St Philip, being only a deacon, had not power to do. Simon the magician was alſo baptized among others; and admiring the power that the apoſtles had, of conferring the Holy Ghoſt, would have bought the ſame power of the apoſtles, and accordingly offered money to St Peter. But Peter with indignation replied to him, Thy money and thou periſh together, who thinkeſt the gifts of God can be bought with money! Thou haſt no part with us, nor haſt any pretenſions to this miniſtry, for thy heart is not right before God. Repent therefore of this wickedneſs, and pray to God if perhaps he will pardon the wicked thoughts of thy heart. After this Peter and John returned again to Jeruſalem. See Acts viii.

The fire of perſecution being now pretty well extinguiſhed, St Peter departed from Jeruſalem (Acts ix. 32, &c.), and viſiting the diſciples from city to city, he came alſo to ſee the ſaints that dwelt at Lydda. Here he found a man called Æneas, who had been paralytic for eight years. St Peter ſaid to him, Æneas, riſe up; Jeſus Chriſt the Lord cures you. He preſently got up; and all that dwelt at Lydda that ſaw the miracle were converted to the Lord. There was alſo at Joppa a certain holy woman, named Tabitha, who happening to die while St Peter was at Lydda, the diſciples ſent to deſire him to come to them. Whereupon St Peter came, and entering into the chamber where Tabitha lay dead, he cauſed every body to go out, and betook himſelf to prayers. Then turning himſelf towards the corpſe, he ſaid, Tabitha, ariſe. At which inſtant ſhe opened her eyes, and ſeeing St Peter, ſhe ſat up. This miracle was much famed at Joppa, and was the occaſion that many were converted. St Peter ſtayed there a good while, taking up his lodging with one Simon a tanner.

Now there was at Cæſarea of Paleſtine a centurion called Cornelius, a man that feared God (Acts x. 1, 2, 3.), and to whom it was revealed by an angel, that he ſhould ſend to Joppa to Peter, who ſhould tell him what he had to do. Cornelius immediately ſent two of his ſervants; and while they were upon the road, the Lord ſent a viſion to Peter, to prepare him to go to this man without any ſcruple, although he was not a Jew; for as yet the door of the goſpel had not been opened to the Gentiles. St Peter, then being at the top of the houſe, fell into a trance, and ſaw, as it were, a great ſheet of linen let down from heaven, which was full of all kinds of animals and reptiles, both clean and unclean. He had this viſion three times, and heard a voice, ſaying, Ariſe Peter, kill and eat. But Peter anſwered, Lord, I have never eaten any thing unclean. The voice replied, Call not that unclean which God has purified. After which the ſheet was again taken up into heaven. At the ſame time, the men came in that had been ſent by Cornelius. They acquainted him with what had happened to their maſter, and deſired him to go along with them to Cæſarea. The day following St Peter ſet out thither, and was accompanied by ſome of the brethren of Joppa. (See Acts x.).

When Peter was returned to Jeruſalem, the faithful of the circumciſion ſaid to him, why have you gone unto the uncircumciſed, and why did you eat with them? but Peter having related to them all that paſſed, they were ſatisfied, and glorified God who had given the gift of repentance leading to life as well to the Gentiles as to the Jews. It is thought, that a little after this Peter went to Antioch, where he founded the Chriſtian church of which he was biſhop (Gal. ii. 11.). It is believed that he continued here ſeven years, though not conſtantly: for during this time, he went to Jeruſalem, and to the provinces of Aſia Minor, to Bithynia, Cappadocia, and Pontus, as is concluded from the epiſtle that he afterwards addreſſed to the faithful of theſe provinces. From thence he went to Rome, in the 42d year of the Chriſtian era; and it is thought that at his leaving Antioch he there fixed St Ignatius in his place. Euſebius thinks, that the chief occaſion of his going to Rome was to oppoſe Simon Magus, who by his deceits had perverted a great number of perſons. However, the preſence of St Peter, and the true miracles that he oppoſed to the tricks of Simon, ruined, or much diminiſhed, the reputation of this impoſtor.

St Peter, leaving Rome, came to Jeruſalem at the paſſover, in the 44th year of the Chriſtian era, when Herod Agrippa began to perſecute the church. That prince put St James the Greater, brother of John, to the ſword (Acts xii. 1, &c.); and perceiving that his death was agreeable to the Jews, he moreover cauſed Peter to be apprehended and put in priſon, with a deſign of executing him publicly after the paſſover. But the very night that Herod thought of putting him to death, as Peter, loaded with chains, was aſleep between two ſoldiers, the angel of the Lord awakened him, broke off his chains, opened the priſon door, and brought him out the length of a ſtreet. Then the angel leaving him, he came to the houſe of Mary the mother of John, where many of the faithful were aſſembled at prayers; and having knocked at the door, a damſel named Rhoda came to open it; but when ſhe heard Peter's voice, inſtead of opening the door, ſhe ran in a tranſport of joy to acquaint the family that Peter was at the door. Thoſe who heard her could not believe it, and ſaid, it was his angel, and not himſelf: but continuing to knock, and being let in, he informed them of what had happened to him.

He then left Jeruſalem; but we are not told what became of him till the time of the council held at Jeruſalem in the year 51. It is thought that before this time he made his ſecond journey to Rome, from whence he wrote his firſt epiſtle.

St Peter was obliged to leave Rome in the year 51 by order of the emperor Claudius, who had baniſhed all Jews from thence, becauſe of the tumults they continually raiſed there, excited by one Chreſtus, as Suetonius ſays, meaning probably by this name Jeſus Chriſt. The apoſtle then returned into Judea, where was held the council of Jeruſalem; in which, after a ſtrict examination of the matter propoſed to Peter and the apoſtles, he ſpoke to them with much wiſdom, ſaying (Acts xv. 7, 8, &c.), that God having given his Holy Ghoſt and the gift of faith to the Gentiles as well as to the Jews, they ought not to impoſe the yoke of the legal obſervances on the new converts, which (as he ſays) neither we nor our fathers have been able to bear. But we believe, that it is through the grace of Jeſus Chriſt that both we and they ſhall be ſaved. St James the Leſs, biſhop of Jeruſalem, ſeconded this opinion of St Peter; and the council came to this concluſion, That no new obligation ſhould be impoſed on the Gentiles, but only that they ſhould be required to abſtain from fornication, from the uſe of blood, and from meats offered to idols. The reſolution of this council was written to the faithful of Antioch, becauſe it was there this queſtion was firſt ſtarted.

Some time after, St Peter coming to Antioch (Gal. ii. 11. &c.), he eat and drank with the Gentiles, without regarding that diſtinction of meats enjoined by the law. But after that, when ſome of the faithful of Jeruſalem came to Antioch, being converted Jews, St Peter, out of fear to offend them, ſeparated himſelf from the converted Gentiles, and would no longer eat with them as before. St Paul, fearing that what St Peter did might be interpreted, as if he had a deſire to oblige the Gentiles to judaize, and to ſubmit themſelves to the yoke of the law, and ſo to revoke and annul what he himſelf had determined in the council of Jeruſalem, he withſtood Peter to his face, and openly expoſtulated with him, telling him, he was much in the wrong to endeavour to oblige the Gentiles, at leaſt tacitly by his own manner of acting, to live as the Jews do; and St Peter received this reprehenſion with ſilence and humility.

The particulars of St Peter's life are little known from the 51ſt year of the vulgar era, in which the council of Jeruſalem was held, till his laſt journey to Rome, which was ſome time before his death. Then being acquainted by revelation that the time of his death was not far off (2 Pet. i. 14.), he had a mind to write to the faithful that had been converted by him, to put them in mind of the truths he had before taught them. He ſent them therefore his ſecond epiſtle.

St Peter and St Paul came to Rome about the ſame time, in the year of Chriſt 65, where they performed many miracles, and made many converts. Simon Magus by his tricks continued here to deceive the people, pretending himſelf to be the Meſſiah, and even attempting to aſcend into heaven; for having cauſed himſelf to be carried up into the air by his dæmons, in a fiery chariot, St Peter and St Paul betook themſelves to their prayers; and then the impoſtor, being forſaken by his dæmons, fell down upon the ground, which fall ſome time afterwards occaſioned his death. See SIMON MAGUS.

Soon after this, St Peter was taken up and thrown into priſon, where it is ſaid he continued for nine months; at laſt he was crucified at Rome in the Via Oſtia; with his head downwards, as he himſelf had deſired of his executioners. This he did out of a ſenſe of humility, for fear it ſhould be thought, as St Ambroſe ſays, that he affected the glory of Jeſus Chriſt, and the more to augment the pain of his execution.

It is ſaid, that the body of St Peter was at firſt buried in the catacombs, two miles from Rome, from whence it was afterwards tranſported to the Vatican, where it has lain ever ſince. His feſtival is celebrated with that of St Paul on the 29th of June. St Peter died in the 66th year of the vulgar era, after having been biſhop of Rome for about 24 or 25 years. His age might be about 74 or 75 years. It is generally

Peter.

agreed, that St Linus was his ſucceſſor. The following is the portraiture that Nicephorus gives us of St Peter, which he has probably taken from the ancient pictures that were preſerved of this apoſtle. He was not fat, but pretty tall and upright, having a fair and paliſh countenance. The hair of his head and beard was thick, frizzled, and not long. His eyes were black, and blood ſhot: his eyebrows protuberant and hairy; his noſe ſomething long, and rather flat than ſharp.

The two epiſtles of St Peter are addreſſed to thoſe Jewiſh converts who were ſcattered throughout Pontus, Galatia, &c. not only upon the perſecution raiſed at Jeruſalem, but upon former diſperſions of the Jews into thoſe places on ſeveral other occaſions. The firſt epiſtle is principally deſigned to comfort and confirm them under thoſe fiery trials and manifold temptations they were then ſubject to, and to direct and inſtruct them how to behave in the ſeveral ſtates and relations both of the civil and the Chriſtian life, that they might not be engaged in thoſe rebellions againſt Cæſar and his officers, then fomented among the Jews; and that they might ſtop the mouths of thoſe who ſpoke againſt them as evil doers. In the ſecond epiſtle, he proſecutes the ſame ſubject, to prevent their apoſtaſy from the faith, on account of any perſecutions they were liable to. He likewiſe guards them againſt the corrupt principles of the Gnoſtics, and thoſe who ſcoffed at the promiſe of Chriſt's coming, as if it would never be verified.

Blackwell's Sacred Claſſics defended.

St Peter's ſtyle, ſays a modern author, expreſſes the noble vehemence and fervour of his ſpirit, the full knowledge he had of Chriſtianity, and the ſtrong aſſurance he had of the truth and certainty of his doctrine; and he writes with the authority of the firſt man in the college of the apoſtles. He writes with that quickneſs and rapidity of ſtyle, with that noble neglect of ſome of the formal conſequences and niceties of grammar, ſtill preſerving its true reaſon and natural analogy (which are always marks of a ſublime genius), that you can ſcarce perceive the pauſes of his diſcourſe and diſtinction of his periods. The great Joſeph Scaliger calls St Peter's firſt epiſtle majeſtic; and we hope he was more judicious than to exclude the ſecond, though he did not name it.

A noble majeſty, and becoming freedom, is what diſtinguiſhes St Peter; a devout and judicious perſon cannot read him without ſolemn attention and awful concern. The conflagration of this lower world, and future judgement of angels and men, in the third chapter of the ſecond, is deſcribed in ſuch ſtrong and terrible terms, ſuch awful circumſtances, that in the deſcription we ſee the planetary heavens and this our earth wrapped up with devouring flames, hear the groans of an expiring world, and the craſhes of nature tumbling into univerſal ruin.

The authority of the ſecond epiſtle of St Peter was for ſome time doubted of, as Origen, Euſebius, St Jerome and others have obſerved. What made the ancients call it in queſtion, is the difference of its ſtyle from the firſt. The third chapter, which deſcribes the cataſtrophe of the viſible world, made Grotius think this epiſtle was wrote after the taking of Jeruſalem; becauſe that was not to happen till after the deſtruction of that city; upon which he conjectures, that Simeon biſhop of Jeruſalem is the author of this epiſtle, and that the inſcription which carries St Peter's name is corrupted. But the beſt critics admit this epiſtle to be the genuine work of St Peter, who diſcovers himſelf, where he ſays, that he was preſent at our Lord's transfiguration; and where he tells the Jews, this was the ſecond letter he had written to them. The reader may ſee this queſtion fully diſcuſſed, and the authority of this epiſtle eſtabliſhed beyond all doubt, by the learned Dr Sherlock, in his *Diſſertation* on the authority of the Second Epiſtle of St Peter.

St Peter has been made the author of ſeveral books; ſuch were, his Acts, his Goſpel, his Revelation, his work about preaching, and another about judgement. There is extant a large hiſtory of St Peter, called the *Recognitions*, aſcribed to St Clement.

PETER of Blois, a learned man of the 12th century, was born about the year 1120, at the city of Blois in France, from whence he derived his name. His parents, being opulent, gave him a learned education. In his youth, when he ſtudied in the univerſity of Paris, he was exceſſively fond of poetry; and when he was a little further advanced in life, he became no leſs fond of rhetoric, to the ſtudy of which he applied with the greateſt ardour. From Paris he removed to Bononia in Italy, to acquire the civil and canon law; in the knowledge of both which he very much excelled. He appears from his writings to have cultivated medicine, and ſeveral branches of the mathematics, with no little care and ſucceſs. The ſtudy of theology was the chief delight and buſineſs of his life, in which he ſpent the greateſt part of his time, and made the greateſt progreſs. But unfortunately it was that ſcholaſtic theology, which conſiſted in vain attempts to prove and explain the many abſurd opinions which then prevailed in the church, by the ſubtleties of Ariſtotelian logic. In attempting to explain in this manner the moſt abſurd of all opinions that ever exiſted amongſt mankind, he was the very firſt perſon who employed the famous word *tranſubſtantiation*, which was ſoon after adopted by the church of Rome, and hath ever ſince made ſo great a noiſe. Being appointed preceptor to William II. king of Sicily in 1167, he obtained the cuſtody of the privy ſeal; and, next to the archbiſhop of Palermo, the prime miniſter, had the greateſt influence in all affairs. But his power was not of long duration; for the archbiſhop being baniſhed in 1168, our author ſoon after left the court of Sicily, and returned into France. He was not long, however, without a royal patron, being invited into England by Henry II. who employed him as his private ſecretary, made him archdeacon of Bath, and gave him ſome other benefices. When he had ſpent a few years at court, he conceived a diſguſt at that way of life (of which he hath drawn a very unpleaſing picture in one of his letters), and retired into the family of Richard archbiſhop of Canterbury, who had made him his chancellor about the year 1176. In this ſtation he continued to the death of the archbiſhop in 1183, enjoying the higheſt degree of favour with that prelate, though he uſed much freedom in reproving him for his remiſſneſs in the government of the church. Our author remained in the ſame ſtation in the family of Archbiſhop Baldwin, who ſucceeded Richard, acting both as his ſecretary and chancellor. He was alſo ſent by that prelate on an embaſſy to Rome in 1187, to plead his cauſe before

fore Pope Urban III. in the famous controverſy between him and the monks of Canterbury about the church of Hackington. After the departure of his friend and patron Baldwin for the Holy Land in 1190, our author was involved in various troubles in his old age, the cauſes of which are not diſtinctly known; and died about the end of the 12th century. It appears from his works, which may be juſtly reckoned among the moſt valuable monuments of the age in which he flouriſhed, to have been a man of great integrity and ſincere piety, as well as of a lively inventive genius and uncommon erudition. His printed works conſiſt of 134 letters, which he collected together at the deſire of Henry II.; of 65 ſermons, delivered on various occaſions; and of 17 tracts on different ſubjects.

Peter the Hermit. See Croisade and Hermit.

Peter I. juſtly ſtyled *Peter the Great*, czar, and afterwards emperor, of Ruſſia, founder of the Ruſſian empire; for though the country was well known, and of great antiquity, yet it had no extent of power, of political influence, or of general commerce, in Europe, till his time. He was born in 1672; and was proclaimed czar when but ten years of age, in excluſion of John his elder brother, who, being of a ſickly conſtitution, was at the ſame time very weak in his underſtanding. The princeſs Sophia, his half-ſiſter, made an inſurrection in favour of John; and to put an end to the civil war, it was at laſt agreed that the two brothers ſhould jointly ſhare the imperial dignity. Peter had been very ill brought up, not only through the general defects of the Ruſſian education, but likewiſe through the arts of the princeſs Sophia, who ſurrounded him with every thing that might ſtifle his natural deſire of knowledge, deprave his mind, and enervate it with pleaſures. Notwithſtanding this, his inclination for military exerciſes diſcovered itſelf in his tendereſt years. He formed a company of 50 men, commanded by foreign officers, clothed and exerciſed after the German manner. He entered himſelf into the loweſt poſt, that of a drummer; and never roſe otherwiſe than as a ſoldier of fortune. Herein his deſign was to teach his nobility, that merit, not birth, was the only title to military employments. He reinforced his company with ſeveral others, till at laſt he had got together a conſiderable body of ſoldiers. As he then had no war on his hands, he exerciſed them in all ſorts of mock engagements, and by this means ſecured to himſelf a body of well-diſciplined troops. The ſight of a Dutch veſſel, which he had met with on a lake belonging to one of his pleaſure-houſes, made ſuch an impreſſion on his mind, that he conceived the almoſt impracticable deſign of forming a navy. His firſt care was to get ſome Hollanders to build ſome ſmall veſſels at Moſcow; and he paſſed two ſucceſſive ſummers on board Engliſh or Dutch ſhips, which ſet out from Archangel, that he might inſtruct himſelf in every branch of naval affairs. In 1696 czar John died, and Peter was now ſole maſter of the empire. In 1697 he ſent an embaſſy to Holland; and went *incognito* in the retinue, and viſited England as well as Holland, in order to inform himſelf fully in the art of ſhip-building. At Amſterdam he worked in the yard as a private ſhip-carpenter, under the name of *Peter Michaelof*; but he has been often heard to ſay, that if he had never gone to England, he had ſtill remained ignorant of that art. In 1700 he had got together a body of ſtanding forces, conſiſting of 30,000 foot; and now the vaſt project he had formed diſplayed itſelf in all its parts. He opened his dominions, which till then had been ſhut up, having firſt ſent the chief nobility of his empire into foreign countries to improve themſelves in knowledge and learning. He invited into Ruſſia all the foreigners he could meet with, who were capable of inſtructing his ſubjects in any manner, and offered them great encouragement to ſettle in his dominions. This raiſed many diſcontents; and the deſpotic authority he exerted on that occaſion was ſcarcely powerful enough to ſuppreſs them. In 1700, being ſtrengthened by the alliance of Auguſtus king of Poland, he made war on Charles XII. king of Sweden. His firſt ill ſucceſs did not deter him; for he uſed to ſay, I know that my armies muſt be overcome for a great while; but even this will at laſt teach them to conquer. He afterwards gained conſiderable advantages: and founded Peterſburg in 1703. In 1709 he gained a complete victory over the Swedes at Pultowa. In 1712 he was incloſed by the Turks on the banks of the Pruth; and ſeemed inevitably loſt, had not the czarina Catherine bribed the grand viſir, and the czar's prudence completed his deliverance. In 1716 he made a tour through Germany and Holland, and viſited the royal academy of ſciences at Paris. It would be endleſs to enumerate all the various eſtabliſhments for which the Ruſſians are obliged to him. He formed an army according to the manner of the politeſt and moſt experienced nations: he fitted out fleets in all the four ſeas which border upon Ruſſia: he cauſed many ſtrong fortreſſes to be raiſed after the beſt plans: and made convenient harbours: he introduced arts

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(A) The following circumſtance, it is ſaid, in ſome meaſure determined Peter to attempt thoſe reformations which he afterwards accompliſhed. Great events have been ſometimes the effect of little cauſes; and it is at leaſt poſſible, that without the occurrence we are going to relate, Ruſſia might ſtill have been in a ſtate of barbariſm. A young Geneveſe, called *Le Fort*, about 1695, went to Moſcow with the Daniſh ambaſſador. The czar Peter, who was then 19 years old, fell in company with this Geneveſe, who had ſoon learnt the Ruſſian tongue, and ſpoke almoſt all the tongues of Europe. Le Fort ingratiated himſelf with the prince, entered into his ſervice, and ſoon afterwards into his familiarity. He made him comprehend that there was a different manner of living and reigning from what had unhappily obtained throughout his vaſt and miſerable empire. A prince muſt be born with an uncommon greatneſs of ſoul to liſten readily to a ſtranger, and to be able to diveſt himſelf of the prejudices of his throne and of his country. The czar was ſenſible that neither himſelf nor his people were yet to be reckoned among men; and that he had an empire to form, but could have no aſſiſtance at home. From that time he took a reſolution to leave his dominions; and ſet out, like another Prometheus, to borrow celeſtial fire for animating his countrymen.

Peter.

arts and ſciences into his dominions, and freed religion from many ſuperſtitious abuſes: he made laws, built cities, cut canals, &c.; was generous in rewarding, impartial in puniſhing; faithful, laborious, and humble; yet was not free from a certain roughneſs of temper natural to his nation. He had indeed cured himſelf of exceſs in drinking; but he has been branded with ſeveral other vices, particularly cruelty. He publiſhed the unfortunate hiſtory of his ſon Prince Alexis (B); towards whom ſome blame his ſeverity, while others think it no more than was neceſſary. He perfectly knew the honour due to perſons of merit; and not only heaped honours upon them during their life, but gave them marks of eſteem even after their death. He died of the ſtrangury in 1725, and left the world with the magnanimity of a hero and the piety of a Chriſtian.

Peter.

Peter was tall of ſtature, and of a bold and majeſtic aſpect, though ſometimes disfigured by convulſions, which altered his features, This deformity was aſcribed to poiſon, given him, as it is ſaid, by his ſiſter Sophia; but it was indeed no other than wine and brandy, which he often drank to exceſs, relying too much on the ſtrength of his conſtitution. He converſed with perſons in all ſtations, from the mechanic to the general of an army; and his converſation was neither like that of a barbarian who makes no diſtinction between men, nor of a popular prince who ſeeks to pleaſe all the world, but that of a perſon who aims at inſtruction. He loved women as much as the king of Sweden, his rival, dreaded them, and all were equally agreeable to him; he valued himſelf on drinking large draughts, rather than ſipping delicious wine. We are told that kings and legiſlators ſhould never ſuffer themſelves

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(B) Alexis, like his father, is ſaid to have married a ſlave, and, like him, quitted Muſcovy ſecretly, but had not the ſame ſucceſs in his undertakings; and the being but a bad imitator of his father, coſt him his life. He became an example of the moſt terrible ſeverity that ever was given from the tribunal of the throne: but, what is much to the honour of the empreſs Catherine, ſhe had no hand in the misfortunes of that prince, who was born of another woman, and loved nothing that his father loved. Catherine was not in the leaſt ſuſpected of acting the cruel ſtepmother. The great crime of the unfortunate Alexis was his being too much a Ruſſian, and his diſapproving every thing that was grand and immortal, and projected by his father for the glory of the nation. One day, hearing ſome Muſcovites lamenting the inſupportable fatigues they were to undergo in the building of Peterſburg, he ſaid, "Take courage, this city will not ſtand long." When he was called to attend his father in a journey of 600 or 700 leagues, which the czar often made, he feigned ſickneſs. He took violent purges for a diſtemper which he had not; and ſuch quantities of medicines, with exceſſive drinking of brandy, impaired his health and his wits. At firſt he had an inclination to learning, was acquainted with geometry and hiſtory, and had learnt the German tongue: but he hated war, and would never learn it; for which he was moſt reproached by his father. They had married him in 1711 to the princeſs of Wolfenbuttle, ſiſter of the empreſs conſort to Charles VI. This marriage was unfortunate; the princeſs was often abandoned for a debauch in brandy, and for Afroſina, a Finland wench, of a large ſtature, well made, and very agreeable. It is reported that the princeſs died of chagrin, if it be poſſible for chagrin to prove mortal; and that afterwards the czarowitz ſecretly eſpouſed Afroſina in 1713, when the empreſs Catherine had juſt brought him a brother, at which he had no reaſon to be uneaſy.

The miſunderſtandings between the father and the ſon became every day more ſerious; till at length the father, about the year 1716, threatened the prince to diſinherit him; and the prince told him that he intended to go into a monaſtery.

The czar, in 1717, renewed his journeys, as well with a view to politics as curioſity. He came at laſt into France. If the ſon had entertained an inclination to revolt, if he had actually had a party formed in his favour, now was the time to declare himſelf; but inſtead of remaining in Ruſſia, making himſelf popular, and creating dependents, he took a journey in his turn, having with much difficulty ſcraped together ſome thouſands of ducats which he had ſecretly borrowed. He threw himſelf under the protection of the emperor Charles VI. brother of his deceaſed wife. They kept him for ſome time *incognito* at Venice, from whence he paſſed to Naples, where he reſided almoſt a year, while neither his father nor any perſon in Ruſſia knew the place of his retreat.

While the ſon kept himſelf thus concealed, the father was at Paris, where he was received with all the reſpect paid him in other places, but with a gallantry nowhere to be found but in France. If he went to viſit a manufactory, and one piece of work attracted his ſight more than another, he was preſented with it the next day. He went to dine at the duke d'Antin's at Petitbourg, where the firſt thing he ſaw was his own picture at full length, in the ſame habit that he wore. When he was at the royal mint of medals, they ſtruck all kinds before him, and preſented him with them; at laſt they ſtruck one which they let drop on purpoſe at his feet, and left him to take it up. He there ſaw himſelf perfectly engraven with theſe words, *Peter the Great*. The reverſe was a Fame, and round her in letters *Vires acquirit eundo*; an alluſion no leſs juſt than flattering to a prince who really acquired new merit by travelling.

After he had ſeen this country, where every thing diſpoſes men to gentleneſs and indulgence, he returned to his own, and reſumed his ſeverity. He had engaged his ſon to return from Naples to Peterſburg, from whence that young prince was conducted to Moſcow before the czar his father: who began with depriving him of his ſucceſſion to the throne, by making him ſign a ſolemn act of renunciation at the end of January 1718, in conſideration of which act the father promiſed the ſon to ſpare his life.

It was not altogether improbable that ſuch an act would have been ſome time or other annulled. The czar, themſelves to be tranſported by paſſion; but never was any man more paſſionate than Peter the Great, or more mercileſs. In a king this is more than an infirmity for which we make amends by confeſſing it; but it was generally remarked of Peter, and he himſelf ſaid to a magiſtrate of Holland, at his ſecond voyage, "I have reformed my nation, and have not been able to reform myſelf." It is true, the cruelties with which he is reproached were not novelties at the court of Moſcow, any more than at that of Morocco: it was not uncommon to ſee a czar, with his own royal hand, inflict 100 laſhes on the naked ſhoulders of a prime officer of the crown, or of a lady of the palace, for failing in their duty, by getting drunk; or to try the goodneſs of his ſabre, by ſtriking off the head of a criminal. Peter had himſelf performed ſome of thoſe ceremonies of his country; Le Fort, however (ſee note A), had authority enough over him at times to ſtay his hand even when lifted up to ſtrike, but he had not Le Fort always near him.

The czar's firſt marriage is thus related in the memoirs of Peter Henry Bruce, Eſq. "It took place in 1690, when he was only 18. He was married to Ottokeſſa Lapuchin, a boyar's daughter, by whom he had Prince Alexis; ſome time after he turned her away and ſhut her up in a monaſtery, on ſuſpicion of infidelity. It was ſaid, that in one of her jealous fits ſhe charged Prince Menzikoff with carrying the czar to drabs of his former acquaintance, who had been his cuſtomers for cakes; upbraiding him with his firſt occupation: and that Menzikoff ever after bore an irreconcileable enmity to both her and her ſon. After the divorce, one Miſs Mons, a very beautiful young lady, born at Moſcow, of foreign parents, was much in favour with the czar; but when he was abroad, Mr Keyſerling, then reſiding at Moſcow as envoy from the king of Pruſſia, paid his addreſſes to, and married her. When the czar returned, he was ſo much offended at Keyſerling, that he ordered him to leave Moſcow, which occaſioned his immediate recal by the king his maſter, who ſent another in his room. It was believed, if his public character had not protected him, he would have ſeverely felt his majeſty's diſpleaſure.

"The czar was ſome time after ſmitten with the charms of another beautiful young lady, the daughter of a foreign merchant in this city: he firſt ſaw her in her father's houſe, where he dined one day. He was ſo much taken with her appearance, that he offered her any terms ſhe pleaſed, if ſhe would live with him; which this virtuous young woman modeſtly refuſed: but dreading the effects of his authority, ſhe put on a reſolution, and left Moſcow in the night, without communicating her deſign even to her parents. Having provided a little money for her ſupport, ſhe travelled on foot ſeveral miles into the country, till ſhe arrived at a ſmall village where her nurſe lived with her huſband and their daughter, the young lady's foſter-ſiſter, to whom ſhe diſcovered her intention of concealing herſelf in the wood near that village: and to prevent any diſcovery, ſhe ſet out the ſame night, accompanied by the huſband and daughter. The huſband being a timber-man by trade, and well acquainted with the wood, conducted her to a little dry ſpot in the middle of a moraſs, and there he built a hut for her habitation.

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therefore, in order to give it more force, forgetting that he was a father, and only remembering that he was the founder of an empire, which his ſon might overturn, and involve in its ancient barbarity, ordered a public proceſs to be drawn up againſt that unfortunate prince, for ſome concealment, with which he was charged, in the confeſſion that they had exacted of him.

An aſſembly was held of the biſhops, inferior eccleſiaſtics, and profeſſors; who found in the Old Teſtament, that thoſe who curſe their father or their mother ſhould be put to death; that David indeed had pardoned Abſalom, who had rebelled againſt him, but that Abſalom was never pardoned by God. Such was their opinion, without drawing any concluſion; but it was in effect ſigning a warrant for his death. Alexis had not in fact curſed his father, neither had he ever revolted like Abſalom; he had never lain publicly with the king's concubines; but he had left the kingdom without his father's permiſſion, and had written letters to his friends in which he only ſignified that he hoped they would one day be mindful of him in Ruſſia. But whatever might be his caſe, of 124 lay judges, who were appointed to ſit on him, there was not one that judged his offences leſs than capital; and thoſe who could not write, made others ſign for them. It is reported in Europe, that the czar had got tranſlated from Spaniſh into Ruſſian the criminal proceſs againſt Don Carlos, that unfortunate prince whom his father Philip II. had confined in a priſon, where the heir of that great monarchy ended his days. But there was nothing like a proceſs carried on againſt Don Carlos, nor was it ever known whether that prince died a natural or a violent death. Peter, the moſt deſpotic of princes, wanted not an example. Certain it is that the prince died the day after the ſentence, and that the czar had at Moſcow one of the beſt apothecary's ſhops in Europe. It is probable, however, that the prince Alexis, the heir of the moſt extenſive empire in the world, being condemned unanimouſly by his father's ſubjects, which were one day to be his own, might die of the ſudden ſhock and change given to the body at the apprehenſion of ſo ſtrange and diſmal a ſentence. The father went to ſee his ſon in his laſt agonies; and it is ſaid he ſhed tears. *Infelix utcunque ferent ea fata nepotes.* Theſe tears, however, did not prevent the wheels from being covered with the broken limbs of his ſon's friends. He beheaded his own brother-in-law Count Lapuchin, brother to his wife Ottokeſſa Lapuchin whom he had divorced, and uncle to Prince Alexis. The prince's confeſſor had alſo his head cut off. If Muſcovy has been civilized, ſhe has, it muſt be confeſſed, paid dear for her improvement.

The remainder of the czar's life was nothing but a ſeries of grand projects, labours, and exploits, that ſeemed to efface the memory of his exceſſive ſeverities, which were perhaps neceſſary. He made frequent ſpeeches to his court and to his council. In one he told them that he had ſacrificed his ſon to the welfare of his dominions.

on. She had depoſited her money with her nurſe to procure little neceſſaries for her ſupport, which were faithfully conveyed to her at night by the nurſe or her daughter, by one of whom ſhe was conſtantly attended in the night time.

"The next day after her flight, the czar called at her father's to ſee her, and finding the parents in anxious concern for their daughter, and himſelf diſappointed, fancied it a plan of their own concerting. He became angry, and began to threaten them with the effects of his diſpleaſure if ſhe was not produced: nothing was left to the parents but the moſt ſolemn proteſtations, with tears of real ſorrow running down their cheeks, to convince him of their innocence, and ignorance of what was become of her; aſſuring him of their fears that ſome fatal diſaſter muſt have befallen her, as nothing belonging to her was amiſſing, except what ſhe had on at the time. The czar, ſatisfied of their ſincerity, ordered great ſearch to be made for her, with the offer of a conſiderable reward to the perſon who ſhould diſcover what was become of her, but to no purpoſe: the parents and relations, apprehending ſhe was no more, went into mourning for her.

"Above a year after this ſhe was diſcovered by an accident. A colonel who had come from the army to ſee his friends, going to hunt in that wood, and following his game through the moraſs, he came to the hut, and looking into it ſaw a pretty young woman in a mean dreſs. After inquiring of her who ſhe was, and how ſhe came to live in ſo ſolitary a place, he found out at laſt that ſhe was the lady whoſe diſappearance had made ſo great a noiſe; in the utmoſt confuſion, and with the moſt fervent intreaties, ſhe prayed him on her knees that he would not betray her; to which he replied, that he thought her danger was now paſt, as the czar was then otherwiſe engaged, and that ſhe might with ſafety diſcover herſelf, at leaſt to her parents, with whom he would conſult how matters ſhould be managed. The lady agreed to this propoſal; and he ſet out immediately, and overjoyed her parents with the happy diſcovery; the iſſue of their deliberation was to conſult Madame Catherine (as ſhe was then called) in what manner the affair ſhould be opened to the czar. The colonel went alſo upon this buſineſs, and was adviſed by Madame to come next morning and ſhe would introduce him to his majeſty, when he might make the diſcovery and claim the promiſed reward. He went according to appointment; and being introduced, told the accident by which he had diſcovered the lady, and repreſented the miſerable ſituation in which he found her, and what ſhe muſt have ſuffered by being ſo long ſhut up in ſuch a diſmal place, from the delicacy of her ſex. The czar ſhowed a great deal of concern that he ſhould have been the cauſe of all her ſufferings, declaring that he would endeavour to make her amends. Here Madame Catherine ſuggeſted, that ſhe thought the beſt amends his majeſty could make, was to give her a handſome fortune and the colonel for a huſband, who had the beſt right, having caught her in purſuit of his game. The czar, agreeing perfectly with Madame Catherine's ſentiments, ordered one of his favourites to go with the colonel, and bring the young lady home; where ſhe arrived to the inexpreſſible joy of her family and relations, who had all been in mourning for her. The marriage was under the direction and at the expence of the czar, who himſelf gave the bride to the bridegroom; ſaying, that he preſented him with one of the moſt virtuous of women; and accompanied his declaration with very valuable preſents, beſides ſettling on her and her heirs three thouſand rubles a-year. This lady lived highly eſteemed by the czar, and every one who knew her. Beſides the concurring reports of other people, I had the ſtory from her own mouth."

On the whole, that Peter I. was a great man, few will deny who know what real greatneſs is. A minute account of the life of this diſtinguiſhed emperor would make a large volume; we have been able to give but the mere outlines of it: the anecdotes, however, at the end, ſhow in ſome degree the nature of the man; at all events they ſhow one important truth, that it is a more difficult thing to reform one's ſelf than to reform a kingdom; to conquer one's paſſions, than to conquer the world. The Ruſſians, however, if there be any good in civilization, owe to him every thing: and they ſeem to be ſenſible of it; for a very pompous oration was delivered to his memory by Michael Lomonoſſoff, before the Academy of Sciences at St Peterſburg, on the 26th of April 1755. For a minuter account of his improvements, &c. ſee RUSSIA, PETERSBURG, and CATHERINE I.

PETER the Wild Boy. This extraordinary creature occaſioned great ſpeculation among the learned; but we do not know that any ſatisfactory cauſes have been aſſigned for the ſtriking difference between him and other human beings.

The following account of him is extracted from the pariſh-regiſter of North-church, in the county of Hertford. "Peter, commonly known by the name of *Peter the Wild Boy*, lies buried in this churchyard, oppoſite to the porch. In the year 1725 he was found in the woods near Hamelen, a fortified town in the electorate of Hanover, when his majeſty George I. with his attendants, was hunting in the foreſt of Hertſwold. He was ſuppoſed to be then about 12 years of age, and had ſubſiſted in thoſe woods upon the bark of trees, leaves, berries, &c. for ſome conſiderable length of time. How long he had continued in that wild ſtate is altogether uncertain; but that he had formerly been under the care of ſome perſon, was evident from the remains of a ſhirt collar about his neck at the time when he was found. As Hamelen was a town where criminals were confined to work upon the fortifications, it was then conjectured at Hanover that Peter might be the iſſue of one of thoſe criminals, who had either wandered into the woods and could not find his way back again, or being diſcovered to be an idiot was inhumanly turned out by his parents, and left to periſh or ſhift for himſelf. In the following year, 1726, he was brought over to England, by the order of Queen Caroline then princeſs of Wales, and put under the care of Dr Arbuthnot with proper maſters to attend him. But notwithſtanding there appeared to be no natural defect in his organs of ſpeech, after all the pains that had been taken with him he could never be brought diſtinctly to articulate a ſingle ſyllable, and proved totally incapable of receiving any inſtruction. He was afterwards intruſted to the care of Mrs Titchbourn, one of the queen's bedchamber women, with a handſome penſion annexed to the charge. Mrs Titchbourn uſually ſpending a few weeks every ſummer at the houſe of Mr James Fenn, a yeoman farmer at Axter's

End in this pariſh, Peter was left to the care of the ſaid Mr Fenn, who was allowed 35l. a-year for his ſupport and maintenance. After the death of James Fenn he was transferred to the care of his brother Thomas Fenn, at another farm-houſe in this pariſh called Broadway, where he lived with the ſeveral ſucceſſive tenants of that farm, and with the ſame proviſion allowed by government to the time of his death, Feb. 22. 1785, when he was ſuppoſed to be about 72 years of age.

"Peter was well made, and of the middle ſize. His countenance had not the appearance of an idiot, nor was there any thing particular in his form, except that two of the fingers of his left hand were united by a web up to the middle joint. He had a natural ear for muſic, and was ſo delighted with it, that if he heard any muſical inſtrument played upon, he would immediately dance and caper about till he was almoſt quite exhauſted with fatigue; and though he could never be taught the diſtinct utterance of any word, yet he could eaſily learn to hum a tune. All thoſe idle tales which have been publiſhed to the world about his climbing up trees like a ſquirrel, running upon all fours like a wild beaſt, &c. are entirely without foundation; for he was ſo exceedingly timid and gentle in his nature, that he would ſuffer himſelf to be governed by a child. There have been alſo many falſe ſtories propagated of his incontinence; but from the minuteſt inquiries among thoſe who conſtantly lived with him, it does not appear that he ever diſcovered any natural paſſion for women, though he was ſubject to the other paſſions of human nature, ſuch as anger, joy, &c. Upon the approach of bad weather he always appeared ſullen and uneaſy. At particular ſeaſons of the year he ſhowed a ſtrange fondneſs for ſtealing away into the woods, where he would feed eagerly upon leaves, beech-maſt, acorns, and the green bark of trees, which proves evidently that he had ſubſiſted in that manner for a conſiderable length of time before he was firſt taken. His keeper therefore at ſuch ſeaſons generally kept a ſtrict eye over him, and ſometimes even confined him, becauſe if he ever rambled to any diſtance from his home he could not find his way back again: and once in particular, having gone beyond his knowledge, he wandered as far as Norfolk, where he was taken up, and being carried before a magiſtrate, was committed to the houſe of correction in Norwich, and puniſhed as a ſturdy and obſtinate vagrant, who would not (for indeed he could not) give any account of himſelf: but Mr Fenn having advertiſed him in the public papers, he was releaſed from his confinement, and brought back to his uſual place of abode.

"Notwithſtanding the extraordinary and ſavage ſtate in which Peter was firſt found greatly excited the attention and curioſity of the public; yet, after all that has been ſaid of him, he was certainly nothing more than a common idiot without the appearance of one. But as men of ſome eminence in the literary world have in their works publiſhed ſtrange opinions and ill-founded conjectures about him, which may ſeem to ſtamp a credit upon what they have advanced; that poſterity may not through their authority be hereafter miſled upon the ſubject, this ſhort and true account of Peter is recorded in the pariſh-regiſter by one who conſtantly reſided above 30 years in his neighbourhood, and had daily opportunities of ſeeing and obſerving him."

Perhaps our readers will not be diſpleaſed if we preſent them with Lord Monboddo's account of this extraordinary creature (A). "It was in the beginning of June 1782 (ſays his lordſhip) that I ſaw him in a farm-houſe called Broadway, within about a mile of Berkhamſtead, kept there upon a penſion which the king pays. He is but low of ſtature, not exceeding five feet three inches; and although he muſt now be about 70 years of age, has a freſh healthy look. He wears his beard; his face is not at all ugly or diſagreeable; and he has a look that may be called ſenſible and ſagacious for a ſavage. About 20 years ago he was in uſe to elope, and to be miſſing for ſeveral days; and once, I was told, he wandered as far as Norfolk; but of late he has been quite tame, and either keeps in the houſe or ſaunters about the farm. He has been the 13 laſt years where he lives at preſent; and before that he was 12 years with another farmer, whom I ſaw and converſed with. This farmer told me, that he had been put to ſchool ſomewhere in Hertfordſhire, but had only learned to articulate his own name Peter, and the name of King George, both which I heard him pronounce very diſtinctly. But the woman of the houſe where he now is (for the man happened not to be at home) told me, that he underſtood every thing that was ſaid to him concerning the common affairs of life; and I ſaw that he readily underſtood ſeveral things that ſhe ſaid to him while I was preſent. Among other things ſhe deſired him to ſing Nancy Dawſon; which he did, and another tune which ſhe named. He never was miſchievous, but had always that gentleneſs of nature which I hold to be characteriſtical of our nature, at leaſt till we became carnivorous, and hunters or warriors. He feeds at preſent as the farmer and his wife do; but, as I was told by an old woman (one Mrs Collop, living at a village in the neighbourhood called Hempſtead, who remembered to have ſeen him when he firſt came to Hertfordſhire, which ſhe computed to be 55 years before the time I ſaw her), he then fed very much upon leaves, and particularly upon the leaves of cabbage, which he ate raw. He was then, as ſhe thought, about 15 years of age, walked upright, but could climb trees like a ſquirrel. At preſent he not only eats fleſh, but has alſo got the taſte of beer, and even of ſpirits, of which he inclines to drink more than he can get. And the old farmer above-mentioned, with whom he lived twelve years before he came to this laſt farmer, told me, that he had acquired that taſte before he came to him, which is about 25 years ago. He has alſo become very fond of fire, but has not yet acquired a liking for money; for though he takes it, he does not keep it, but gives it to his landlord or landlady, which I ſuppoſe is a leſſon that they have taught him. He retains ſo

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(A) This eccentric writer, in ſupport of his hypotheſis, that man in a ſtate of nature is a mere animal, without clothes, houſes, the uſe of fire, or even ſpeech, adduces the oran-outang, or man in the woods, and this Peter the wild man and others, as examples. He denies the want of the organs of ſpeech as an objection, and inſiſts they only want the artificial uſe of them.

much of his natural instinct, that he has a fore-feeling of bad weather, growling and howling, and ſhowing great diſorder, before it comes.

"These are the particulars concerning him which I obſerved myſelf, or could learn by information from the neighbourhood." From all theſe facts put together his lordſhip makes the following obſervations:

"1ſt, Whatever doubts there may be concerning the humanity of the oran-outang, it was never made a queſtion but that Peter was a man.

"2dly, That he was, as the Dean [Swift] ſays, of a father and mother like one of us. This, as I have ſaid, was the caſe of two ſavages found in the Diſmal ſwamp in Virginia, of the one found in the iſland of Diego Garcia, and of him that was diſcovered by M. le Roy in the Pyrenees, and in general of all the ſavages that have been found in Europe within theſe laſt 300 years; for I do not believe, that for theſe 2000 years paſt there has been a race of ſuch ſavages in Europe.

"3dly, I think there can be no reaſon to doubt of what was written from Hanover, and publiſhed in the newſpapers, that he was found going upon all fours, as well as other ſolitary ſavages that have been found in Europe. It is true that others have been found erect; which was the caſe of the two found in the Diſmal ſwamp of Virginia, likewiſe of the man of the Pyrenees, and of him in the iſland of Diego Garcia: but theſe I ſuppoſe were not expoſed till they had learned to walk upright; whereas Peter appears to have been abandoned by his parents before he had learned that leſſon, but walked as we know children do at firſt.

"4thly, I think it is evident that he is not an idiot, not only from his appearance, as I have deſcribed it, and from his actions, but from all the accounts that we have of him, both thoſe printed and thoſe atteſted by perſons yet living: for as to the printed accounts, there is not the leaſt information of that kind in any of them, except in one, viz. Wye's letter, N° 8. wherein is ſaid, that ſome imputed his not learning to ſpeak to want of underſtanding; which I ſhould think ſhowed rather want of underſtanding in thoſe who thought ſo, when it is conſidered that at this time he had not been a year out of the woods, and I ſuppoſe but a month or two under the care of Dr Arbuthnot, who had taken the charge of his education. The Dean indeed tells us, that he ſuſpected he was a pretender, and no genuine wild man, but not a word of his being an idiot. And as to the perſons living, not one with whom I have converſed appeared to have the leaſt ſuſpicion of that kind; though it is natural that men who were not philoſophers, and knew nothing of the progreſs of man from the mere animal to the intellectual creature, nor of the improvement of our underſtanding by ſocial intercourſe and the arts of life, but believed that man when he came to a certain age has from nature all the faculties which we ſee him exert, and particularly the faculty of ſpeech, ſhould think him an idiot, and wanting even the capacity of acquiring underſtanding. I knew an officer of dragoons, a man of very good ſenſe, who was quartered where Peter then lived for ſome months, and ſaw him almoſt every day, and who aſſured me that he was not an idiot, but ſhowed common underſtanding, which was all that could be expected from one no better educated than he.

"Laſtly, thoſe who have conſidered what I have ſaid (B) of the difficulty of articulation, will not be ſurpriſed that a man who had lived a ſavage for the firſt 12 or 13 years of his life, ſhould have made ſo little progreſs in that art. I cannot, however, have the leaſt doubt, that if he had been under the care of Mr Braidwood of Edinburgh, he would have learned to ſpeak, though with much more difficulty than a man who had been brought up tame among people who had the uſe of ſpeech, and who conſequently muſt know the advantage of it. And I can have as little doubt that Mr Braidwood could have taught the oran-outang in Sir Aſhton Lever's collection, who learned to articulate a few words, ſo as to ſpeak plainly enough."

St PETER, *Le Port*, a market-town of England, in the ſouth eaſt part of Guernſey, in Hampſhire, in the Britiſh channel, conſiſting of only one long and narrow ſtreet. The mouth of the harbour is well ſet with rocks, and is moreover defended by a caſtle; one called the *Old caſtle*, and the other *Caſtle-cornet*. The governor of the iſland generally reſides here, who has the command of the garriſon in this and all the other caſtles. The harbour has a good road, from whence ſhips may ſail with any wind, and from the road paſs under the guns of the caſtle to the pier, cloſe up to the town. The pier is a noble work, formed of vaſt ſtones, joined together with great art and regularity; it is not only a ſecurity to the ſhips, but, being contiguous to the town, is handſomely paved at the top with large ſmooth flagſtones, guarded with parapets, and, being of a great length and breadth, forms a pleaſant walk, affording a free proſpect of the ſea and the neighbouring iſlands. Cornet caſtle, which commands both the town and the harbour, ſtands on a rock, ſeparated from the land by an arm of the ſea, no leſs than 600 yards wide, and not fordable but at low water in great ſpring-tides.

St PETER's iſland, in the lake of Bienne in Switzerland, remarkable for being one of the retreats of Rouſſeau; whence it has alſo got the name of *Rouſſeau's iſland*. It lies towards the ſouth ſide of the lake, and produces a great variety of ſhrubs and trees, particularly large oaks, beech, and Spaniſh cheſnut. The ſouthern ſhore ſlopes gradually to the lake, and is covered with herbage; the remaining borders are ſteep and rocky; their ſummits in a few places thinly covered with ſhrubs; in others their perpendicular ſides are clothed to the water's edge with hanging woods. The views from the different parts of the iſland are beautiful and diverſified; that to the north being the moſt extenſive and pleaſing. It commands the proſpect of the lake, which is of an oval form; its cultivated borders, interſperſed with villages and caſtles, with the towns of Nidau and Bienne ſtanding upon the farther extremity. Agreeable walks are carried through the woods, and terminate in a circular pavilion placed in the centre of the iſland. Before the troubles in France, on Sunday, and particularly the vintage-time, this iſland was filled with

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(B) Lord Monboddo, far from thinking ſpeech or articulation natural to man, rather wonders how he can by any teaching or imitation attain to the ready performance of ſuch various and complicated operations. Add to this, when the organs are completely formed to one language, how hard it is to make them anſwer another.

Peter Peter-borough.

with people who amuſed themſelves with wandering about the woods or dancing in the circular pavilion. How they employ themſelves now it is not ſo eaſy to ſay, as it was overrun and infeſted by the forces of that unhappy nation, and of courſe tainted with their deſtructive principles. It was taken by the Spaniards, and properly belongs to the king of Sardinia. There is only one farm-houſe on the iſland, in an apartment of which Rouſſeau was lodged.

PETER-Pence, was an annual tribute of one penny, paid at Rome out of every family at the feaſt of St Peter. And this Ina the Saxon king, when he went in pilgrimage to Rome about the year 740, gave to the pope, partly as alms and partly in recompence of a houſe erected in Rome for Engliſh pilgrims. And this continued to be paid generally until the time of King Henry VIII. when it was enacted, that from henceforth no perſon ſhall pay any penſions, Peter-pence, or other impoſitions, to the uſe of the biſhop or ſee of Rome.

PETERBOROUGH, a city of Northamptonſhire, about 82 miles from London. It is the leaſt city except perhaps Ely, and unqueſtionably the pooreſt biſhopric, though one of the oldeſt towns in England. It had a monaſtery dedicated to St Peter, and founded as early as the year 655, to which the abbot of Croyland and his monks flying for protection in the year 870, they were overtaken and murdered in a court of this monaſtery, called the *monks churchyard*, becauſe they were all buried here; and to this day is to be ſeen the tombſtone with their effigies, which had been erected over their common grave. Soon after this the Danes deſtroyed both the monaſtery and friars, ſo that it lay deſtitute for above 100 years. The monks were, however, reſtored, and lived very ſumptuouſly, with a mitred abbot at their head, till the reformation, when Henry VIII. converted it into a biſhop's ſee. The cathedral, which is ſaid to be more than 1000 years old, though apparently more modern, is a moſt noble Gothic fabric, and was much more ſo before it was defaced in the civil wars. The weſt front, which is 156 feet broad, is very ſtately; and beſides columns curiouſly adorned, is ſupported by three of the talleſt arches in Britain. The windows of the cloiſters are finely ſtained with ſcripture hiſtory and the ſucceſſion of its abbots. There are in the church monuments of Queen Catharine, wife of Henry VIII. and of Mary queen of Scots; and the figure of one Mr Scarlet the ſexton, who buried them, and lived to 95, after he had buried all the houſekeepers of the town twice over. There is but one pariſh-church beſides the cathedral. The city is governed by a mayor, recorder, and aldermen, by a charter of Henry VIII. All its officers are elected by the dean and chapter, conſiſting of ſix prebendaries, who are all lords of the manor. Beſides the dean and chapter, who are an eccleſiaſtical corporation diſtinct from the biſhop, there are eight petty canons, four ſtudents in divinity, one epiſtler, one goſpeller, a ſubdean, ſubtreaſurer, and chanter, eight choriſters, eight ſinging men, two chancellors, beſides a ſteward, organiſt, &c. a grammar ſchool, and two charity ſchools. The river Nen, over which there is here a wooden bridge, is navigable by barges to Northampton, 50 miles further, which bring coal, corn, &c. and by which they export in ſome years 6000 quarters of malt, beſides other goods, eſpecially the woollen manufactures either of cloth or ſtockings, in which the poor are employed. The air of Peterborough is ſaid not to be very wholeſome, by reaſon of the neighbouring fens; yet the water of the river is freſh and good, the higheſt ſpring-tide never coming up within five miles of the town; and there is plenty of excellent water in their wells. The ſtreets are very poor, and the houſes but mean; there is, however, a handſome market-houſe, over which are kept the aſſizes and ſeſſions. Its juriſdiction extends over 32 towns and hamlets, wherein the civil magiſtrates appointed by the royal commiſſion are veſted with the ſame power as judges of aſſize, and hold their quarterly ſeſſions in this city.

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PETERHEAD, a town in Scotland, in the county of Aberdeen, lies about 30 miles north-eaſt of that city. It ſtands on the moſt eaſterly point in Scotland, and from thence due weſt that kingdom is broadeſt.

Peterhead is the neareſt land to the northern continent of Europe, and lies within 300 miles of the *cape*, which is called the *Naze of Norway*. Through this channel the grand body of the herrings paſs in their annual migrations from Shetland and the north ſeas to the more ſouthern latitudes, attended with the all-devouring cod and ling; on which account Peterhead, or, as it is ſometimes called, *Buchanneſs*, hath always been the ſecond ſtation of the Dutch buſſes after leaving the Shetland iſlands. Tradition ſays, that ſome hundred years ago the Dutch offered Lord Mareſchal, then the proprietor of the coaſt, to cover a ſmall iſland called *Inch-Keith* with ſilver for the property of it to carry on their fiſheries, which for obvious reaſons could not be accepted. Be that as it may, the Dutch, in time of peace, ſtill frequent the coaſt in July and Auguſt, and ſometimes 100 ſail are ſeen within ſight of land, buſily employed in the herring and white fiſheries. The natives, to whom this treaſure properly belongs, have lately made ſome attempts towards the white fiſhery, of which they cure and vend, chiefly at the London market, 4000 barrels of delicate ſmall cod and ling annually. They alſo fit out ſome veſſels for the Hebride fiſhery off Barrahead for the Barcelona market; and they claim the merit of having taught the iſlanders how to take and cure the large fiſh which abound on their coaſts. They have often gained the higheſt premiums offered by government for curing white fiſhes.

Few harbours in Great Britain are of more importance to navigation than this of Peterhead, as, in caſe of violent ſtorms from the eaſterly points, large veſſels embayed betwixt this and the mouth of the Forth have not a port that they can ſafely take at every time of the tide, that of Aberdeen excepted. If therefore they cannot make their way to ſea in the teeth of a ſtrong eaſterly wind, or double this headland that they may gain the Murray frith, they muſt inevitably come on ſhore. This harbour lies on a ſpacious bay, where veſſels of any burden may ride in all other winds, and is therefore the general rendezvous of the ſhipping which frequent the northern ſeas, where they caſt anchor on clean ground, and ride ſafely till the ſtorms have abated. But though nature hath done ſo much for the benefit of navigation, ſomething is left for the exerciſe of human aid. The harbour can at preſent contain in perfect ſafety 40 or 50 ſail of veſſels drawing 12 feet water, and is capable of being extended ſo as to admit a greater number of ſhips drawing 20 feet; by which means not only coaſters and merchantmen but ſmall ſhips of war with their convoy would find this a moſt deſirable refuge when purſued by ſuperior force. The harbour is defended by a good battery. A conſiderable trade is carried on from this place directly to the Baltic for deals, iron, hemp, tar, and other articles. There is alſo a manufacture of ſewing thread, which employs many young girls. A mineral well in the ſummer-months gives great gaiety to the place; its ſalutary virtues have long, and we believe very juſtly, been celebrated. The waters of this ſpring are powerfully diuretic, and are thought to be efficacious in removing complaints in the bowels.

Twelve pounds avoirdupois of this water were analyzed by Dr Laing, who found it compoſed of

Muriate of iron,	30.75 grains.
Carbonate of iron,	3.25
Muriate of lime,	7.00
Siliceous earth,	2.00
Sulphate of lime,	2.00
——— ſoda,	13.25
Muriate of ſoda,	7.5

Carbonic acid gas, 83.5 cubic inches. The ingenious author of the above analyſis recommends this water very much in caſes of ſcrofula. Its moſt valuable property is tonic, which is no doubt derived from the iron that enters into its compoſition.

There are here many elegant houſes for the accommodation of ſtrangers. There is alſo a ball-room, under which there are two ſalt-water baths. Theſe baths are much frequented in nervous diſorders: their effect in ſtrengthening the conſtitution is often ſurpriſing. Owing to the open peninſulated ſituation, the air of this place is eſteemed peculiarly pure and healthful; even the fogs riſing from the ſea are thought to be medicinal: the town is therefore much enlivened by the concourſe of company who frequent it on theſe accounts. Upon the whole, the town is neat and well built, the houſes are handſome, and the ſtreets tolerably ſpacious and very clean; and it has every appearance of a thriving, plentiful, and happy place. In 1793, the population was 4100, being an increaſe of 1613, ſince the return to Dr Webſter.

PETERHOFF, in Ruſſia, is ſituated about 20 miles from Peterſburg, and is diſtinguiſhed for its palace and gardens. The palace was begun by Peter I. and finiſhed by Elizabeth. As it is placed upon an eminence, it commands a moſt ſuperb view of Cronſtedt, Peterſburg, the intervening gulf, and the oppoſite coaſt of Carelia. The palace is moſt magnificently furniſhed, and the ſuite of apartments are truly princely. The preſence-chamber is richly ornamented with portraits of the ſovereigns of the houſe of Romanof, who have reigned in Ruſſia ſince 1613.

Coxe's Travels, vol. i. p. 485.

"The gardens of Peterhoff (ſays an intelligent traveller) have been celebrated for their taſte and elegance; and from the number of jet d'eaus, fountains, baſons, caſcades, parterres, &c. they have been compared to thoſe of Verſailles: and indeed in one reſpect they are far ſuperior; for the water-works of the latter only play upon particular occaſions, while thoſe of Peterhoff are perennial. Theſe gardens, which at the time of their formation were greatly admired in this country, though not congenial to the taſte of the empreſs, are ſuffered to remain in their preſent ſtate; as during ſummer her majeſty principally reſides at Tzarſkoe-Selo, where the grounds are diſpoſed in a more modern and pleaſing manner." A vaſt number of ſilver dolphins and gilded ſtatues are ſcattered through them; but the moſt remarkable figures are thoſe of two gladiators placed in a baſon of water. Theſe are repreſented, not with the ſword and buckler, the ancient implements of war, but with a brace of piſtols. Theſe they point to each other in a threatening poſture, while the water guſhes impetuouſly from the barrels. In that part of the garden which lies between the palace and the gulf, cloſe to the water, is a building which was the favourite retreat of Peter I. It is preſerved, together with its furniture, entirely in its original ſtate with a kind of religious veneration. Its plainneſs ſhows the frugal ſimplicity in which that monarch was accuſtomed to live. In the ſame celebrated gardens there is a remarkable building called the *mountain for ſledges*, and often by travellers the *flying mountain*. "It ſtands (ſays Mr Coxe) in the middle of an oblong area, incloſed by an open colonnade, with a flat roof, which is railed for the convenience of holding ſpectators. The circumference of this colonnade is at leaſt half a mile. In the middle of the area ſtands the flying mountain, ſtretching nearly from one end to the other. It is a wooden building, ſupported upon pillars, repreſenting an uneven ſurface of ground, or a mountain compoſed of three principal aſcents, gradually diminiſhing in height, with an intermediate ſpace to reſemble valleys: from top to bottom is a floored way, in which three parallel grooves are formed. It is thus uſed: a ſmall carriage containing one perſon being placed in the centre groove upon the higheſt point, goes with great rapidity down one hill; the velocity which it acquires in its deſcent carries it up a ſecond; and it continues to move in a ſimilar manner until it arrives at the bottom of the area, where it rolls for a conſiderable way on the level ſurface, and ſtops before it attains the boundary: it is then placed in one of the ſide grooves, and drawn up by means of a cord fixed to a windlaſs. To a perſon unacquainted with the mechaniſm, this entertainment would appear tremendous; but as the grooves always keep the carriage in its right direction, there is not the leaſt danger of being overturned. At the top of the mountain is a handſome apartment for the accommodation of the court and principal nobility; there is alſo room for many thouſand ſpectators within the colonnade and upon its roof. Near the flying mountain is a ſpacious amphitheatre, in which tournaments are uſually exhibited."

PETERS, Father, a Jeſuit, was confeſſor and counſellor to James II. king of England. This prince diſmiſſed him in 1688, becauſe he was conſidered as the author of thoſe troubles in which the kingdom was then involved. "He was (ſays Biſhop Burnet) the moſt violent of the king's adviſers, and the perſon moſt liſtened to. Though he had the honour of being nobly deſcended, he was a man of no extenſive erudition, and was eminent only for his bigotry and forwardneſs." Though Burnet is not always to be believed, yet certain it is, from the teſtimony of other hiſtorians, that Father Peters was by no means a perſon properly qualified to direct King James in the critical ſituation in which he then ſtood.

PETERSBURG, St, a city of the province of Ingria in Ruſſia, and capital of the whole empire. It is ſituated in N. Lat. 59. 26. 23. and E. Long. 30. 25. from

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from the firſt meridian of Greenwich. It was founded in the year 1703 by Czar Peter the Great, whoſe ambition it was to have a fleet on the Baltic; for which reaſon he determined to found a city which might become the centre of trade throughout all his dominions. The ſpot he pitched upon was a low, fenny, uncultivated iſland, formed by the branches of the river Neva, before they fall into the gulf of Finland. In the ſummer this iſland was covered with mud; and in winter became a frozen pool, rendered almoſt inacceſſible by dreary foreſts and deep moraſſes, the haunts of bears, wolves, and other ſavage animals. Having taken the fort of Nattebourg, and the town of Neiſchanz, in the year 1703, this mighty conqueror aſſembled in Ingria above 300,000 men, Ruſſians, Tartars, Coſſacks, Livonians, and others, even from the moſt diſtant parts of his empire, and laid the foundation of the citadel and fortifications, which were finiſhed in four months, almoſt in deſpite of nature. He was obliged to open ways through foreſts, drain bogs, raiſe dykes, and lay cauſeways, before he could pretend to found the new city. The workmen were ill provided with neceſſary tools and implements, ſuch as ſpades, pick-axes, ſhovels, planks, and wheel-barrows: they were even obliged to fetch the earth from a great diſtance in the ſkirts of their garments, or in little bags made of old mats and rags ſewed together. They had neither huts nor houſes to ſhelter them from the ſeverity of the weather: the country, which had been deſolated by war, could not accommodate ſuch a multitude with proviſions; and the ſupplies by the lake Ladoga were often retarded by contrary winds. In conſequence of theſe hardſhips, above 100,000 men are ſaid to have periſhed: nevertheleſs the work proceeded with incredible vigour and expedition; while Peter, for the ſecurity of his workmen, formed a great camp, in ſuch a manner, that his infantry continued in Finland, and his cavalry were quartered in Ingria. Some Swediſh cruizers being deſcried in the neighbourhood, the czar poſted a body of troops in the iſle of Rutzari, by whom the Swedes were repulſed, and the work met with no farther interruption. The buildings of the city kept pace with the fortreſs, which is the centre of the town, ſurrounded on all ſides by the Neva; and in little more than a year, above 30,000 houſes were erected. At preſent there may be about double that number in Peterſburg, though many of them are paultry and inconſiderable. In order to people this city, Peter invited hither merchants, artificers, mechanics, and ſeamen, from all the different countries of Europe: he demoliſhed the town of Nieuſchants, and brought hither not only the materials of the houſes, but the inhabitants themſelves. A thouſand families were drawn from Moſcow; he obliged his nobility to quit their palaces and their villas in and about Moſcow, and take up their reſidence at Peterſburg, in a much more cold and comfortleſs climate. Finally, reſolving to remove hither the trade of Archangel, he iſſued an ordonnance, importing, that all ſuch merchandiſe as had been conveyed to Archangel, in order to be ſold to foreigners, ſhould now be ſent to Peterſburg, where they ſhould pay no more than the uſual duties. Theſe endeavours and regulations have rendered this one of the greateſt and moſt flouriſhing cities in Europe. The Ruſſian boyars and nobility have built magnificent palaces, and are now reconciled to their ſituation. At firſt many houſes were built of timber; but theſe being ſubject to ſudden conflagrations in ſpite of all the precautions that could be taken, the czar, in the year 1714, iſſued an order, that all new houſes ſhould be walled with brick and covered with tiles. The fort is an irregular hexagon, with oppoſite baſtions. This, together with all the reſt of the fortifications, was in the beginning formed of earth only; but in the ſequel they were faced with ſtrong walls, and provided with caſemates, which are bomb-proof. In the curtain of the fort, on the right hand ſide, is a noble diſpenſary, well ſupplied with excellent medicines, and enriched with a great number of porcelain vaſes from China and Japan. From one of the gates of the fort a draw-bridge is thrown over an arm of the river, in which the czar's galleys and other ſmall veſſels are ſheltered in the winter. The moſt remarkable building within the fort is the cathedral, built by the direction of an Italian architect. Peterſburg is partly built on little iſlands, ſome of which are connected by draw-bridges; and partly on the continent. In the higheſt part, on the bank of the Neva, the czar fixed his habitation, or ordinary reſidence, built of freeſtone, and ſituated ſo as to command a proſpect of the greater part of the city. Here likewiſe is a royal foundery; together with the ſuperb houſes of many noblemen. The marſhy ground on which the city is built, being found extremely ſlippery, dirty, and incommodious, the czar ordered every inhabitant to pave a certain ſpace before his own door. In the year 1716, Peter, taking a fancy to the iſland Waſili-Oſterno, which he had given as a preſent to Prince Menzikoff, reſumed the grant, and ordered the city to be extended into this quarter. He even obliged the boyars, or nobles, to build ſtone-houſes on this ſpot, though they were already in poſſeſſion of others on the ſide of Ingria: accordingly this is now the moſt magnificent part of the city. On the other ſide of a branch of the Neva ſtands the czar's country or ſummer palace, provided with a fine garden and orangery. On the bank of the ſame river is the ſlaboda, or ſuburbs, in which the Germans generally chooſe their habitation. Peterſburg is very much ſubject to dangerous inundations. In the year 1715, all the baſtions and draw-bridges were either overwhelmed or carried away. The breadth, depth, and rapidity of the Neva, have rendered it extremely difficult, if not impracticable, to join the iſlands and the continent by bridges. Beſides, Peter was averſe to this expedient for another reaſon: reſolved to accuſtom his ſubjects to navigation, he not only rejected the project of a bridge, but alſo ordered that no boat ſhould paſs between the iſlands and continent, except by the help of ſails only. In conſequence of this ſtrange regulation, many lives were loſt: but at length he gained his point; and by habituating his ſluggiſh Muſcovites to the dangers of the ſea, in a little time produced a breed of hardy ſailors. The adjacent country is ſo barren, that the town muſt be ſupplied with proviſions from a great diſtance; conſequently they are extremely dear. Here are woods in plenty, conſiſting of pine, fir, alder, birch, poplar, and elm; but the oak and the beech are generally brought from Caſan. In winter the weather is extremely cold, and hot in the ſummer. In June the length of the night does not exceed three hours, during which the

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nights are only a continued twilight: but in December the ſun is not viſible more than three hours above the horizon.

The czar Peter, who was indefatigable in his endeavours to improve and civilize his ſubjects, neglected nothing which he thought could contribute to theſe purpoſes. He condeſcended even to inſtitute and regulate aſſemblies at Peterſburg: theſe were opened at five in the afternoon, and the houſe was ſhut at ten: between theſe hours the faſhionable people of both ſexes met without ceremony, danced, converſed, or played either at cards or at cheſs, this laſt being a favourite diverſion among the Ruſſians. There was likewiſe an apartment appointed for drinking brandy and ſmoking tobacco. Plays and operas were likewiſe introduced for the ſame purpoſes; but as Peter had little reliſh, and leſs taſte, for thoſe entertainments, they were performed in a very aukward manner in his lifetime: however, ſince his death theſe performances have been brought to a greater degree of art and decorum.

This great northern legiſlator eſtabliſhed, in the neighbourhood of Peterſburg, manufactures of linen, paper, ſaltpetre, ſulphur, gunpowder, and bricks, together with water-mills for ſawing timber. He inſtituted a marine academy, and obliged every conſiderable family in Ruſſia to ſend at leaſt one ſon or kinſman, between the ages of ten and eighteen, to this ſeminary, where he was inſtructed in navigation, learned the languages, was taught to perform his exerciſes, and to live under the ſevereſt diſcipline. To crown his other plans of reformation, he granted letters patent for founding an academy, upon a very liberal endowment; and though he did not live to execute this ſcheme, his empreſs, who ſurvived him, brought it to perfection. It was modelled on the plans of the Royal Society in London, and the academy of France. Mr Bullfinger opened it in the year 1726, with an eloquent ſpeech on the deſign and utility of an academy of ſciences; and the profeſſors, who have always diſtinguiſhed themſelves by their merit and erudition, publiſhed an annual collection of their tranſactions; a taſk the more eaſy, as they have the benefit of printing-preſſes, well managed, at Peterſburg.

Peter the Great has been much cenſured for transferring the ſeat of the empire from Moſcow to St Peterſburg; the former of which lay nearer to the centre of his dominions. But theſe objections will have but little weight with thoſe who conſider the conſequences of the removal. The new city is nearer than Moſcow was to the more civilized parts of Europe; and from an intercourſe with them the manners of the Ruſſians have been improved, and the nobility in particular have loſt much of their feudal importance. Above all, the grand object of Peter, that of having a formidable navy in the Baltic, has certainly been obtained, and the empreſs of Ruſſia is now the arbitreſs of the north, and in ſome degree the mediatrix of all Europe. In ſhort, the erection of St Peterſburg was perhaps one of the beſt acts of Peter's reign, and has in its conſequences been the moſt beneficial. Indeed it is at leaſt probable, that if through any revolution the ſeat of government ſhould be again transferred to Moſcow, we ſhould nowhere ſee the traces of thoſe memorable improvements, which the paſſing century has given birth to, but in the annals of hiſtory; and Ruſſia would again, in all probability, relapſe into her original barbariſm.

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The erection of ſuch a city as Peterſburg in ſo ſhort a time is truly wonderful. Mr Coxe ſays his mind was filled with aſtoniſhment, when he reflected that ſo late as the beginning of the 18th century the ground on which it ſtands was one vaſt moraſs, occupied by a very few fiſhermen's huts. The preſent diviſions of the town, ſome of which we have already mentioned, are called, 1. The Admiralty quarter; 2. The Vaſſili Oſtrof or Iſland; 3. The Fortreſs; 4. The Iſland of St Peterſburg; and, 5. The various ſuburbs of Livonia, of Moſcow, of Alexander Nevſki, and Wiburg.

The late empreſs has done ſo much for this city, that ſhe may not improperly be called its ſecond foundreſs. It is, nevetheleſs, ſtill an infant place, and, as Mr Wraxall obſerves, "only an immenſe outline, which will require future empreſſes, and almoſt future ages, to complete."

Coxe's Travels.

"The ſtreets in general, ſays a late traveller, are broad and ſpacious; and three of the principal ones, which meet in a point at the admiralty, and reach to the extremities of the ſuburbs, are at leaſt two miles in length. Moſt of them are paved; but a few are ſtill ſuffered to remain floored with planks. In ſeveral parts of the metropolis, particularly in the Vaſſili Oſtrof, wooden houſes and habitations, ſcarcely ſuperior to common cottages, are blended with the public buildings; but this motley mixture is far leſs common than at Moſcow, where alone can be formed any idea of an ancient Ruſſian city. The brick houſes are ornamented with a white ſtucco, which has led ſeveral travellers to ſay that they are built with ſtone; whereas, unleſs I am greatly miſtaken, there are only two ſtone ſtructures in all Peterſburg. The one is a palace, building by the empreſs upon the banks of the Neva, called *the marble palace*; it is of hewn granite, with marble columns and ornaments; the other is the church of St Iſaac, conſtructed with the ſame materials, but not yet finiſhed.

"The manſions of the nobility are many of them vaſt piles of building, but are not in general upon ſo large and magnificent a ſcale as ſeveral I obſerved at Moſcow: they are furniſhed with great coſt, and in the ſame elegant ſtyle as at Paris or London. They are ſituated chiefly on the ſouth ſide of the Neva, either in the Admiralty quarter, or in the ſuburbs of Livonia and Moſcow, which are the fineſt parts of the city." See Neva.

"Peterſburg, although it is more compact than the other Ruſſian cities, and has the houſes in many ſtreets contiguous to each other, yet ſtill bears a reſemblance to the towns of this country, and is built in a very ſtraggling manner. By an order lately iſſued from government, the city has been incloſed within a rampart, the circumference whereof is 21 verſts, or 14 Engliſh miles."

The ſame accurate obſerver calculates the number of inhabitants at Peterſburg, and makes the medium number 130,000.

We have already ſaid that Peterſburg is very liable to be inundated. An inundation of a very alarming nature took place when Mr Coxe was there in September 1777, of which the following account was given in Journal St Peterſburg, September 1777: "In the evening of the 9th, a violent ſtorm of wind blowing at firſt S. W. and afterwards W. raiſed the Neva and its various branches to ſo great a height, that at five in

Peterſburg. the morning, the waters poured over their banks, and ſuddenly overflowed the town, but more particularly the Vaſiliotrof and the iſland of St Peterſburg. The torrent roſe in ſeveral ſtreets to the depth of four feet and a half, and overturned, by its rapidity, various buildings and bridges. About ſeven, the wind ſhifting to N. W. the flood fell as ſuddenly, and at midday moſt of the ſtreets, which in the morning could only be paſſed in boats, became dry. For a ſhort time, the river roſe 10 feet 7 inches above its ordinary level."

Mr Krafft, profeſſor of experimental philoſophy to the Imperial Academy of Sciences, has written a judicious treatiſe upon the inundation of the Neva, from which the following obſervations were extracted by Mr Coxe. "Theſe floods are leſs alarming than formerly, as the ſwelling of the river to about ſix feet above its uſual level, which uſed to overflow the whole town, has no longer any effect, excepting upon the lower parts of Peterſburg; a circumſtance owing to the gradual raiſing of the ground by buildings and other cauſes.

"Upon tracing the principal inundations, the profeſſor informs us that the moſt ancient, of which there is any tradition, happened in 1691, and is mentioned by Weber, from the account of ſome fiſhermen inhabiting near Nieſchants, a Swediſh redoubt upon the Neva, about three miles from the preſent fortreſs of Peterſburg. At that period the inundations happened every five years; and the inhabitants of that diſtrict no ſooner perceived the particular ſtorms which they had been taught from fatal experience to conſider as forerunners of a flood, than they took their hovels to pieces, and, joining the timbers together in the form of rafts, faſtened them to the ſummits of the higheſt trees, and repaired to the mountain of Duderof, which is about 20 miles from their place of abode, where they waited till the waters ſubſided.

"The higheſt inundation, excepting the laſt of 1777, were thoſe of the 11th of November 1726, when the waters roſe 8 feet 2 inches; and of the 2d of October 1752, when they roſe 8 feet 5 inches.

"From a long courſe of obſervations the profeſſor draws the following concluſion. The higheſt floods, namely, thoſe which riſe about ſix feet, have generally happened in one of the laſt four months of the year: no ſenſible effect is ever produced by rains or thaws; a ſwell is ſometimes occaſioned by the accumulation of maſſes of ice at the mouth of the Neva: but the principal cauſes of the overflowing of that river are derived from violent ſtorms and winds blowing north-weſt or ſouth-weſt, which uſually prevail at the autumnal equinox; and the height of the waters is always in proportion to the violence and duration of thoſe winds. In a word, the circumſtances moſt liable to promote the overflowings of the Neva, are when, at the autumnal equinox, three or four days before or after the full or new moon, that luminary being near her perigæum, a violent north-weſt wind drives the waters of the northern ocean, during the influx of the tide, into the Baltic, and this effect is immediately ſucceeded by a ſouth-weſt wind in that ſea and the gulf of Finland. All theſe circumſtances concurred at the inundation of 1777: it happened two days before the autumnal equinox, one before the full moon, two after her paſſing through the perigeum, and by a ſtorm at ſouth-weſt, which was preceded by ſtrong weſt winds in the northern ocean, and ſtrong north winds at the mouth of the Baltic."

See Krafft's *Memoires for his diſſertation on the Neva at Peterſburg, accompanied with a chart repreſenting the height of the inundations*, &c. in Nov. Act. Pet. for 1777, Par. II. p. 47. to which excellent treatiſe we would refer the curious reader for further information.

All our readers have unqueſtionably heard of the equeſtrian ſtatue of Peter I. in bronze. We ſhall give an account of that extraordinary monument in Mr Coxe's own words. "It is of a coloſſal ſize, and is the work of Monſieur Falconet, the celebrated French ſtatuary, caſt at the expence of Catherine II. in honour of her great predeceſſor, whom ſhe reveres and imitates. It repreſents that monarch in the attitude of mounting a precipice, the ſummit of which he is endeavouring to attain. He appears crowned with laurel, in a looſe Aſiatic veſt, and ſitting on a houſing of bearſkin: his right hand is ſtretched out as in the act of giving benediction to his people; and his left holds the reins. The deſign is maſterly, and the attitude is bold and ſpirited. If there be any defect in the figure, it conſiſts in the flat poſition of the right hand; and for this reaſon, the view of the left ſide is the moſt ſtriking, where the whole appearance is graceful and animated. The horſe is rearing upon its hind legs; and its tail, which is full and flowing, ſlightly touches a bronze ſerpent, artfully contrived to aſſiſt in ſupporting the vaſt weight of the ſtatue in due equilibrium. The artiſt has, in this noble eſſay of his genius, repreſented Peter as the legiſlator of his country, without any alluſion to conqueſt and bloodſhed; wiſely preferring his civil qualities to his military exploits. The contraſt between the compoſed tranquillity of Peter (though perhaps not abſolutely characteriſtical) and the fire of the horſe, eager to preſs forwards, is very ſtriking. The ſimplicity of the inſcription correſponds to the ſublimity of the deſign, and is far preferable to a pompous detail of exalted virtues, which the voice of flattery applies to every ſovereign without diſtinction. It is elegantly finiſhed in braſs characters, on one ſide in Latin, and on the oppoſite in Ruſſian. *Petro primo Catharina ſecunda*, 1782; i.e. Catherine II. to Peter I.

"This ſtatue, when I was at Peterſburg, was not erected, but ſtood under a large wooden ſhed near the Neva, within a few yards of its enormous pedeſtal. When Falconet had conceived the deſign of his ſtatue, the baſe of which was to be formed by a huge rock, he carefully examined the environs of Peterſburg, if, among the detached pieces of granite which are ſcattered about theſe parts, one could be found of magnitude correſpondent to the dimenſions of the equeſtrian figure. After conſiderable reſearch, he diſcovered a ſtupendous maſs half buried in the midſt of a moraſs, The expence and difficulty of tranſporting it were no obſtacles to Catherine II. By her order the moraſs was immediately drained, a road was cut through a foreſt, and carried over the marſhy ground; and the ſtone which, after it had been ſomewhat reduced, weighed at leaſt 1500 tons, was removed to Peterſburg. This more than Roman work was, in leſs than ſix months from the time of its firſt diſcovery, accompliſhed by a windlaſs, and by means of large [illegible] alternately placed and removed in grooves fixed on each ſide of the road. In this manner it was drawn, with 40 men ſeated upon its top, about four miles, to the banks of the Neva; there it was embarked in a veſſel conſtructed on purpoſe to receive it, and thus conveyed about the ſame diſtance by water to the ſpot where it now ſtands. When landed at Peterſburg, it was 42 feet long at the baſe, 36 at the top, 21 thick, and 17 high; a bulk greatly ſurpaſſing in weight the moſt boaſted monuments of Roman grandeur, which, according to the fond admirers of antiquity, would have baffled the ſkill of modern mechanics, and were alone ſufficient to render conſpicuous the reign of the moſt degenerate emperors.

“ The pedeſtal, however, though ſtill of prodigious magnitude, is far from retaining its original dimenſions, as, in order to form a proper ſtation for the ſtatue, and to repreſent an aſcent, the ſummit whereof the horſe is endeavouring to attain, its bulk has been neceſſarily diminiſhed. But I could not obſerve, without regret, that the artiſt has been deſirous to improve upon nature; and, in order to produce a reſemblance of an abrupt broken precipice, has been too laviſh of the chiſſel. Near it was a model in plaſter, to the ſhape of which the workmen were faſhioning the pedeſtal. It appeared to me, that in this model the art was too conſpicuous; and that the effect would have been far more ſublime, if the ſtone had been left as much as poſſible in its rude ſtate, a vaſt unwieldy ſtupendous maſs. And indeed, unleſs I am greatly miſtaken, the pedeſtal, when finiſhed according to this plan, will have ſcarcely breadth ſufficient to afford a proper baſe for a ſtatue of ſuch coloſſal ſize.

“ The ſtatue was erected on the pedeſtal on the 27th of Auguſt 1782. The ceremony was performed with great ſolemnity, and was accompanied with a ſolemn inauguration. At the ſame time the empreſs iſſued a proclamation, in which, among other inſtances of her clemency, ſhe pardons all criminals under ſentence of death; all deſerters, who ſhould return to their reſpective corps within a limited time; and releaſes all criminals condemned to hard labour, provided they had not been guilty of murder.”

Mr Coxe informs us, that the weather is extremely changeable in this capital, and the cold is at times extreme; againſt which the inhabitants take care to provide (ſee PEASANT), though ſome of them nevertheleſs unfortunately fall victims to it. “ As I traverſed the city, (ſays Mr Coxe), on the morning of 12th January, I obſerved ſeveral perſons whoſe faces had been bitten by the froſt: their cheeks had large ſcars, and appeared as if they had been ſinged with an hot iron. As I was walking with an Engliſh gentleman, who, inſtead of a fur cap, had put on a common hat, his ears were ſuddenly frozen: he felt no pain, and would not have perceived it for ſome time, if a Ruſſian, in paſſing by, had not informed him of it, and aſſiſted him in rubbing the part affected with ſnow, by which means it was inſtantly recovered. This, or friction with flannels, is the uſual remedy; but ſhould the perſon in that ſtate approach the fire, or dip the part in warm water, it immediately mortifies and drops off.—The common people continued at their work as uſual, and the drivers plied in the ſtreets with their ſledges ſeemingly unaffected by the froſt; their beards were incruſted with clotted ice, and the horſes were covered with iſicles.

“ It ſometimes happens that coachmen or ſervants, while they are waiting for their maſters, are frozen to death. In order to prevent as much as poſſible theſe dreadful accidents, great fires of whole trees, piled one upon another, are kindled in the court-yard of the palace and the moſt frequented parts of the town. As the flames blazed above the tops of the houſes, and caſt a glare to a conſiderable diſtance, I was frequently much amuſed by contemplating the picturesque groups of Ruſſians, with their Aſiatic dreſs and long beards, aſſembled round the fire. The centinels upon duty, having no beards, which are of great uſe to protect the glands of the throat, generally tie handkerchiefs under their chins, and cover their ears with ſmall caſes of flannel.”

The police of this city has been much admired. This eſtabliſhment conſiſts of a police maſter, two preſidents, the one for criminal, the other for civil caſes, and two conſulters, choſen from the burgher claſs. To this is committed the care to maintain decorum, good order and morals; the attainment of which is thus accompliſhed.

The reſidence is divided into ten departments, each of which has a preſident, who muſt poſſeſs a correct knowledge of the inhabitants in his own department, of which he is regarded as the *cenſor morum.* His houſe muſt be a refuge both night and day for all in diſtreſs; and he muſt not leave the city for two hours, under any pretext whatever, without appointing a ſubſtitute to act in his abſence. The conſtables and watchmen of his department are ſubject to his orders; and in the diſcharge of his duty, he has two ſergeants to attend him.

Each department has three, four, or five ſubdiviſions, of which there are 42 in the whole reſidence. Each of theſe has a quarter-inſpector, and under him a quarter-lieutenant. The duty of all theſe is in uniſon with that of the preſident, but the ſphere of their activity is more circumſcribed. They ſettle trivial affairs, and keep a watchful eye over every thing that paſſes.

The night watchmen are 500 in number, who have ſtations aſſigned them, and are to be aiding in the ſeizing of offenders, or in any ſervice their commanders may require. There is alſo a command of 120 men, who are ſupported by a regiment of huſſars, ſhould the nature of their duty be at any time ſo hazardous as to render ſuch a meaſure neceſſary.

This piece of political mechaniſm is ſo harmoniouſly connected in all its parts, that it becomes the admiration of every foreigner.

So extraordinary is the vigilance obſerved by every part of this admirable whole, that all ſecret inquiſitions are totally ſuperfluous. The police has a knowledge of every perſon in the reſidence; travellers are ſubject to certain formalities, in conſequence of which to hide the place of their abode, or the time of their departure, are alike impracticable. Every houſeholder muſt declare to the police who lodges with him, or what ſtrangers have put up at his houſe. When travellers leave the town, they muſt publiſh in the newſpapers their name, quality, and place of abode, three different times, and produce the papers containing ſuch advertiſement.

Peterſburg, ‖ Petit.

The police who watches over its tranquillity of every kind, ſo that nothing inimical to the exiſting government can either be privately attempted, or ſafely carried into execution. The diſturbers of the public peace in this city muſt of conſequence be few in number.

The court called *oral*, ſits every day, and proceeds orally in all the cauſes brought before it; keeping at the ſame time a day-book, in which the deciſions of the court are entered, and every week it is laid before the ſitting magiſtrate. Every cauſe muſt be determined in one day, or in three at moſt, if the collecting of examinations ſhould be intricate and tedious. But ſome travellers have given a more unfavourable account of the police of the Ruſſian metropolis, and have declared that murder and robbery may ſometimes be committed with impunity, if the guilty have it in their power to bribe the watchmen.

PETERSBURGH, in America, is a ſea-port town in Virginia, 25 miles ſouthward of Richmond, ſeated on the ſouth ſide of the Appamatox river, about 12 miles above its junction with James river, and contained nearly 300 houſes in 1787, in two diviſions; one is upon a cold clay ſoil, and is very dirty; the other upon a plain of ſand or loam. There is no regularity, and very little elegance in Peterſburgh. It is merely a place of buſineſs. The Free Maſons have a hall tolerably elegant; and the ſeat of the Bowling family is pleaſant and well built. It is very unhealthy. About 2200 hogſheads of tobacco are inſpected here annually. Like Richmond, Williamſburgh, Alexandria, and Norfolk, it is a corporation; and what is ſingular, Peterſburgh city comprehends part of three counties. The celebrated Indian queen, Pocahonta, from whom deſcended the Randolph and Bowling families, formerly reſided at this place.

PETERSFIELD, a handſome town of Hampſhire in England, and ſends two members to parliament. It is ſeated in W. Long. 1. 5. N. Lat. 51. 5.

PETERWARADIN, a fortified town in Sclavonia, and one of the ſtrongeſt frontier places the houſe of Auſtria has againſt the Turks. Seated on the Danube between the Drave and the Save. E. Long. 20. 0. N. Lat. 45. 20.

PETIOLE, in *Botany*, the ſlender ſtalks that ſupport the leaves of a plant.

PETIT, or PETTY, a French word ſignifying *little* or *ſmall*.

PETITE Guerre, denotes the operations of detached parties and the war of poſts. See WAR, Part III.

PETIT Serjeanty. See SERJEANTY.

PETIT Treaſon. See TREASON.

PETIT, *John*, a doctor of the Sorbonne, very early gained to himſelf a character by his knowledge, and thoſe eloquent orations which he pronounced before the univerſity of Paris. He was employed in the famous embaſſy which was ſent from France to Rome, for the purpoſe of healing the ſchiſm in 1407; but he ſoon loſt all the honour which he had acquired. John Sans Peur, duke of Burgundy, having treacherouſly contrived to aſſaſſinate Louis of France, duke of Orleans, only brother to Charles VI. John Petit, entirely devoted to the views of the murderer, maintained in a public diſſertation, at Paris, the 8th of March 1408, that the murder was lawful. He had the effrontery to aſſert, that "it is allowable to employ fraud, treaſon, and every other method however baſe, in order to get rid of a tyrant; and that no faith ought to be kept with him." He dared to add further, that "the man who ſhould commit ſuch an action, not only deſerved to be exempted from puniſhment, but to receive a reward." This ſanguinary doctrine was loudly exclaimed againſt; but the duke of Burgundy's powerful influence ſheltered Petit for ſome time. Some eminent writers, however, of that period, with Gerſon at their head, denounced the doctrine to John de Montaigu, biſhop of Paris, who condemned it as heretical the 23d November 1414. It was likewiſe condemned by the council of Conſtance the year following at the inſtigation of Gerſon; but no notice was taken either of Petit's name or his writings. In fine, the king, on the 16th of September 1416, ordered the parliament of Paris to pronounce a ſevere decree againſt this dangerous performance; and it was alſo cenſured by the univerſity. But the duke of Burgundy, in 1418, had intereſt enough to compel the grand vicars of the biſhop of Paris, who then lay ſick at St Omer's, to retract the ſentence which that prelate had paſt in 1414. Petit died three years before, i. e. in 1411, at Heſdin; and his apology in favour of the duke of Burgundy, with all the particulars of that important tranſaction, may be ſeen in the 5th volume of the laſt edition of Gerſon's works. Father Pinchinat, of the order of St Francis, and author of the Dictionary of Hereſies, in 4to, has endeavoured to vindicate his order from a charge brought by ſome writers who have called Petit a *Cordelier*, or *Franciſcan friar*. "He proves very clearly (ſays Abbé Prevot) that he was a ſecular prieſt; and adds, that upon the ſame evidence, Father Marcier, a Cordelier, had a warm diſpute in 1717 with M. Dupin, who had given this title to Petit in his Collection of Centuries. He repreſented to him (ſays he), before a meeting of the Faculty, the falſity of ſuch a claim, and the injury which he offered to the order of St Francis. Dupin, convinced of his error, candidly owned that he was led into it by following ſome infidel writers, and promiſed to retract it in the new edition of the Centuries, which was publiſhed in 1720. M. Fleury, who had committed the ſame miſtake, promiſed alſo to make amends for it by a ſolemn recantation; but dying before he had an opportunity of doing that piece of juſtice to the Cordeliers, the continuator of his Eccleſiaſtical Hiſtory, who had not ſuch opportunities of information, fell into the ſame fault." (*Pour & contre*, tom. x. p. 23.). If we take the opinion of L'Advocat's Dictionary, it would appear no fault was committed; for it gives a liſt of the almoners of the duke of Burgundy, in order to prove that John Petit was a Cordelier. Indeed, it is highly probable that if Dupin, Fleury, and Father Fabré, did not alter their opinion, it was owing to a firm perſuaſion that they had committed no error.

PETIT, *John Lewis*, an eminent ſurgeon, born at Paris in 1674. He had ſo early an inclination to ſurgery, that Mr Littre, a celebrated anatomiſt, being in his father's houſe, he regularly attended that gentleman's lectures, from his being ſeven years of age. He was received maſter in ſurgery in the year 1700; and acquired ſuch reputation in the practice of that art, that in 1726 the king of Poland ſent for him to his court, and in 1734 the king of Spain prevailed on him to go into that kingdom. He reſtored the health of thoſe

Petit, Petitio, Petitot.

princes; and they endeavoured to detain him by offering him great advantages, but he chose rather to return to France. He was received into the academy of sciences in 1715; became director of the royal academy of surgery; made several important discoveries; and invented new inſtruments for the improvement of ſurgery. He died at Paris in 1750. He wrote an excellent Treatiſe on the Diſeaſes of the Bones, the beſt edition of which is that of 1723; and many learned Diſſertations in the Memoirs of the Academy of Sciences, and in the firſt volume of the Memoirs of Surgery.

PETITIO principii, in *Logic*, the taking a thing for true, and drawing concluſions from it as ſuch, when it is really falſe, or at leaſt wants to be proved before any inferences can be drawn from it.

PETITION, a ſupplication made by an inferior to a ſuperior, and eſpecially to one having juriſdiction. It is uſed for that remedy which the ſubject hath to help a wrong done by the king, who hath a prerogative not to be ſued by writ: In which ſenſe it is either general, That the king do him right; whereupon follows a general indorſement upon the ſame, *Let right be done the party*: Or it is ſpecial, when the concluſion and indorſement are ſpecial, for this or that to be done, &c.

By ſtatute, the ſoliciting, labouring, or procuring the putting the hands or conſent of above twenty perſons to any petition to the king, or either houſe of parliament, for alterations in church or ſtate, unleſs by aſſent of three or more juſtices of the peace of the county, or a majority of the grand jury at the aſſizes or ſeſſions, &c. and repairing to the king or parliament to deliver ſuch petition with above the number of ten perſons, is ſubject to a fine of 100l. and three months impriſonment, being proved by two witneſſes within ſix months, in the court of *B. R.* or at the aſſizes, &c. And if what is required by this ſtatute be obſerved, care muſt be taken that petitions to the king contain nothing which may be interpreted to reflect on the adminiſtration; for if they do, it may come under the denomination of a libel: and it is remarkable, that the petition of the city of London for the ſitting of a parliament was deemed libellous, becauſe it ſuggeſted that the king's diſſolving a late parliament was an obſtruction of juſtice; alſo the petition of the ſeven biſhops, ſent to the Tower by James II. was called a libel, &c. To ſubſcribe a petition to the king, *to frighten him into a change of his meaſures, intimating, that if it be denied many thouſands of his ſubjects will be diſcontented*, &c. is included among the contempts againſt the king's perſon and government, tending to weaken the ſame, and is puniſhable by fine and impriſonment.

PETITORY ACTION, in *Scots Law*. See LAW, N° clxxxiii. 18. 20.

PETITOT, JOHN, a curious painter in enamel, who was born at Geneva in 1607, reached a great degree of perfection in the art. He was wonderfully patient in finiſhing his works, but he had the addreſs to conceal his labour. He only painted the heads and hands of the figures: the hair, grounds, and drapery, being executed by Bordier his brother-in-law. Theſe two artiſts had the credit of aſſociating and labouring together for fifty years, without the leaſt miſunderſtanding between them. It is aſſerted by an ingenious French writer, that Petitot and Bordier derived the knowledge of the moſt curious and durable colours proper for enamelling, from Sir Theodore Mayerne at London, who recommended Petitot to Charles I. He had the honour to paint the portraits of that monarch and the whole royal family, and continued in England until Charles's unhappy end: he then went to Paris, where he was highly favoured by Louis XIV. and acquired an ample fortune. Being a Proteſtant, the revocation of the edict of Nantz obliged to retire to Geneva; but ſettling ſoon after at Veray in the canton of Bern, he paſſed the remainder of his life in eaſe and affluence. He died in 1691.

Petitot, Petiver.

Petitot may be called the inventor of painting portraits in enamel. Though his friend Bordier made ſeveral attempts before him, and Sir Theodore Mayerne had facilitated the means of employing the moſt beautiful colours; yet Petitot completed the works, which under his hand acquired a ſoftneſs and livelineſs of colouring that will never change, and will ever render his works valuable. He made uſe of gold and ſilver plates, and ſeldom enamelled on copper. When he firſt came in vogue, his price was 20 louis's a head, which he ſoon raiſed to 40. It was his cuſtom to take a painter with him, who painted the picture in oil; after which Petitot ſketched out his work, which he always finiſhed after the life. When he painted the king of France, he took thoſe pictures for his copies that moſt reſembled him; and the king afterwards gave him a ſitting or two to finiſh his work.

PETIVER, JAMES, a celebrated Engliſh botaniſt, was contemporary with Plukenet; but we are wholly unacquainted with the preciſe time of his birth. He was by profeſſion an apothecary, having ſerved an apprenticeſhip under Mr Feltham, apothecary to Bartholomew's hoſpital, He ſettled in Alderſgate-ſtreet when he commenced buſineſs on his own account, where he continued during the whole of his life. His buſineſs was extenſive; and he was afterwards choſen apothecary to the Charter-houſe. Excepting Sir Hans Sloane, and Mr Courten, he was the only perſon after the Tradeſcants, who made any important collections in natural hiſtory, previous to thoſe of the preſent day. He employed the captains and ſurgeons of different ſhips to bring him home ſpecimens; and by means of printed directions he enabled them to ſelect proper objects. In this manner his collection ſoon became ſo valuable, that he was offered 4000l. for it by Sir Hans Sloane, ſome time prior to his deceaſe; but, after he died, it was purchaſed by that naturaliſt. His fame was extended both at home and abroad by his valuable muſeum. He was choſen a fellow of the Royal Society; and having become acquainted with Ray, he aſſiſted him in arranging the ſecond volume of his Hiſtory of Plants. He died on the 20th of April, 1718; and his funeral was honoured by the attendance of Sir Hans Sloane, and other eminent men, as pall-bearers.

He publiſhed ſeveral works, on different ſubjects of natural hiſtory, ſuch as *Muſci Petiveriani Centuriæ decem*, 1692—1703, 8vo: *Gazophylacii Naturæ et Artis, Decades decem*, folio, 1702, with 100 plates: A catalogue of Mr Ray's Engliſh Herbal, illuſtrated with figures, folio, 1713, and continued in 1715: Many ſmall publications, which may be found enumerated in Dr Pultney's book: Many papers in the Philoſophical Tranſactions; and a material article in the third volume of Ray's work, entitled, *Plantæ Rariores Chinenſes,* *Madras patanæ, et Africanæ, à Jacobo Petivero ad opus conſummandum collatæ*, &c. Many of his ſmall tracts having become ſcarce, his works were collected and publiſhed, excluſive of his papers in the Tranſactions, in 2 vols. folio, in the year 1764.

PETIVERIA, a genus of plants belonging to the hexandria claſs, and in the natural method ranking under the 12th order, *Holoraceæ*. See BOTANY *Index*.

PETRA, (Cæſar, Lucan), a town of Greece, on the coaſt of Illyricum, near Dyrrhachium, and not far from the mouth of the river Panyaſus.—Another PETRA, (Livy); a town of Mædica, a diſtrict of Thrace, lying towards Macedonia; but in what part of Macedonia, he does not ſay.

PETRA (Ptolemy), *Petræa* (Silius Italicus), *Petrina* (Italicus), in both which laſt *urbs* is underſtood; an inland town of Sicily, to the ſouth-weſt of Engyum. Now *Petraglia* (Cluverius).

PETRA Jecktael (2 Kings xiv.), a town of the Amalekites; near the Adſcenſus Scorpionis (Judges i.) and the valley of Salt in the ſouth of Judea; afterwards in the poſſeſſion of the Edomites, after deſtroying the Amalekites.

PETRA Recem, or *Rekem*, ſo called from Rekem king of the Midianites, ſlain by the Iſraelites (Num. xxxi.). Formerly called *Arce*, now *Petra;* the capital of Arabia Petræa (Joſephus). Ptolemy places it in Long. 66. 45. from the Fortunate iſlands, and Lat. 30. 20. It declines therefore 80 miles to the ſouth of the parallel of Jeruſalem, and 36 miles, more or leſs, from its meridian to the eaſt. Joſephus ſays, that the mountain on which Aaron died ſtood near Petra; which Strabo calls the capital of the Nabatæi; at the diſtance of three or four days journey from Jericho. This Petra ſeems to be the Sela of Iſaiah xvi. 1. and xlii. 11. the Hebrew name of *Petra* "a rock:" Though ſome imagine Petra to be no older than the time of the Macedonians.

PETRARCH, FRANCIS, a celebrated Italian poet, was born at Arezzo in 1304, and was the ſon of Petrarco di Parenzo. He ſtudied grammar, rhetoric, and philoſophy, for four years at Carpentras; from whence he went to Montpelier, where he ſtudied the law under John Andreas and Cino of Piſtoia, and probably from the latter received a taſte for Italian poetry. As Petrarch only ſtudied the law out of complaiſance to his father, who on his viſiting him to Bologna had thrown in the fire all the Latin poets and orators except Virgil and Cicero; he, at 22 years of age, hearing that his father and mother were dead of the plague at Avignon, returned to that city to ſettle his domeſtic affairs, and purchaſed a country-houſe in a very ſolitary but agreeable ſituation, called *Vaucluſe;* where he firſt knew the beautiful Laura, with whom he fell in love, and whom he has immortaliſed in his poems. He at length travelled into France, the Netherlands, and Germany; and at his return to Avignon entered into the ſervice of Pope John XXII. who employed him in ſeveral important affairs. Petrarch was in hopes of being raiſed to ſome conſiderable poſts: but being diſappointed, he applied himſelf entirely to poetry; in which he met with ſuch applauſe, that in one and the ſame day he received letters from Rome and the chancellor of the univerſity of Paris, by which they invited him to receive the poetic crown. By the advice of this friends, he preferred Rome to Paris, and received that crown from the ſenate and people on the 8th of April 1341. "The ceremony of his coronation (ſays Gibbon) was performed in the Capitol, by his friend and patron the ſupreme magiſtrate of the republic. Twelve patrician youths were arrayed in ſcarlet; ſix repreſentatives of the moſt illuſtrious families, in green robes, with garlands of flowers, accompanied the proceſſion; in the midſt of the princes and nobles, the ſenator, count of Anguillara, a kinſman of the Colonna, aſſumed his throne; and at the voice of a herald Petrarch aroſe. After diſcourſing on a text of Virgil, and thrice repeating his vows for the proſperity of Rome, he knelt before the throne, and received from the ſenator a laurel crown, with a more precious declaration, 'This is the reward of merit.' The people ſhouted, 'Long life to the Capitol and the poet!' A ſonnet in praiſe of Rome was accepted as the effuſion of genius and gratitude; and after the whole proceſſion had viſited the Vatican, the profane wreath was ſuſpended before the ſhrine of St Peter. In the act or diploma which was preſented to Petrarch, the title and prerogatives of poet-laureat are revived in the Capitol after the lapſe of 1300 years; and he receives the perpetual privilege of wearing, at his choice, a crown of laurel, ivy, or myrtle; of aſſuming the poetic habit; and of teaching, diſputing, interpreting, and compoſing, in all places whatſoever, and on all ſubjects of literature. The grant was ratified by the authority of the ſenate and people; and the character of citizen was the recompenſe of his affection for the Roman name. They did him honour, but they did him juſtice. In the familiar ſociety of Cicero and Livy, he had imbibed the ideas of an ancient patriot; and his ardent fancy kindled every idea to a ſentiment, and every ſentiment to a paſſion." His love of ſolitude at length induced him to return to Vaucluſe; but, after the death of the beautiful Laura, Provence became inſupportable to him, and he returned to Italy in 1352; when, being at Milan, Galeas Viceconti made him counſellor of ſtate. Petrarch ſpent almoſt all the reſt of his life in travelling to and from the different cities in Italy. He was archdeacon of Parma, and canon of Padua; but never received the order of prieſthood. All the princes and great men of his time gave him public marks of their eſteem; and while he lived at Arcqua, three miles from Padua, the Florentines deputed Boccace to go to him with letters, by which they invited him to Florence, and informed him, that they reſtored to him all the eſtate of which his father and mother had been deprived during the diſſenſions between the Guelphs and Gibelines. He died a few years after at Arcqua, in 1374. He wrote many works that have rendered his memory immortal; theſe have been printed in four volumes folio. His life has been written by ſeveral authors. Amongſt theſe there was one by Mrs Suſanna Dobſon, in 2 volumes 8vo, collected and abridged from the French. In this work we have the following elegant and juſt character of Petrarch.

"Few characters, perhaps, have ſet in a ſtronger light the advantage of well regulated diſpoſitions than that of Petrarch, from the contraſt we behold in one particular of his life, and the extreme miſery he ſuffered from the indulgence of an affection, which, though noble and delightful when juſtly placed, becomes a reproach and a torment to its poſſeſſor when once directed to an improper object. For, let us not deceive ourselves or others: though [illegible] the character of Laura they are [illegible] of all guilt in her person! [illegible] was a married woman, it is not [illegible] the principles of religion and morality, to [illegible] which is due to every [illegible] of the [illegible] which are the [illegible] and peace in civil society, and which are [illegible] with the [illegible] to divine authority.

"In this particular of his character, therefore, it is [illegible] that Petrarch will become a warning to those unhappy minds, who, partaking of the [illegible] but not yet [illegible], may be led, by the contemplation [illegible] regard for the honour of human nature, [illegible] the most secret recesses of the heart, to [illegible] happy inclination in its birth, and [illegible] in their power, the [illegible] of those passions [illegible] otherwise dangerous [illegible].

"As to the cold or callous [illegible] those who, incapable of [illegible] themselves, can neither enjoy the view of it when presented in its most perfect form, nor pity it [illegible], as in this work, they appear unhappily indulged beyond the bounds of judgement and [illegible]: to such minds I make no address, well convinced, that, as no callous heart can enjoy, neither [illegible] in danger of being misled, by the example of Petrarch in this tender but unfortuante circumstance of his character.

"To [illegible] and feeling minds alone Petrarch will be ever dear. Such, while they regret his failings, and consider them as warnings to themselves, will love his virtues; and, touched by the glowing piety and heart-felt contrition which often impressed his soul, will [illegible] to partake with him in these pathetic and [illegible] reflections which are produced in grateful and affectionate hearts, on reviewing their own lives, and contemplating the works of God.

"Petrarch had received from nature a very dangerous present. His figure was so distinguished as to attract universal admiration. He appears, in his portraits, with large and manly features, eyes full of fire, a blooming complexion, and a countenance that bespoke all the genius and fancy which shone forth in his works. In the flower of his youth, the beauty of his person was so very striking, that wherever he appeared, he was the object of attention. He possessed an understanding active and penetrating, a brilliant wit, and a fine imagination. His heart was candid and benevolent, susceptible of the most lively affections, and inspired with the noblest sentiments of liberty.

"But his failings must not be concealed. His temper was, on some occasions, violent, and his passions headstrong and unruly. A warmth of constitution hurried him into irregularities, which were followed with repentance and remorse.—No essential reproach, however, could be cast on his manners, till after the 23d year of his age. The fear of God, the thoughts of death, the love of virtue, and those principles of religion which were inculcated by his mother, preserved him from the surrounding temptations of his earlier life."

A resemblance has been traced, in several instances, between this admired poet and our late famous Yorick.—Both, we know, had great wit and genius, and no less imprudence and eccentricity; both were canons, or prebendaries, the Italian of Padua, &c. and the English of York; they both "ran over France, without [illegible]." If the Bishop of Lombes patronised and corresponded with the one, a prelate * of the English church, now deceased, [illegible] in a letter, to [illegible] with the other. From their attachment to Laura and Eliza, both married women, these two platonic lovers were equally warm, and equally innocent. And, even after death, a most remarkable circumstance has attended them both: some persons, we are told, stole Petrarch's bones, in order to sell them; and in like manner, Yorick's body, it is confidently affirmed, was also stolen, and his skull has been exhibited at Oxford.

* Dr Gil- [illegible]

† His [illegible] sion.

PETRE, or SALTPETRE. See NITRE, CHEMISTRY and MINERALOGY *Index*.

PETREA, in *Botany*, a genus of plants belonging to the didynamia class; and in the natural method ranking under the 40th order, *Personatæ*. See BOTANY *Index*.

PETREL. See PROCELLARIA, ORNITHOLOGY *Index*.

PETRIFACTION, in *Natural History*, denotes the conversion of wood, bones, and other substances, principally animal or vegetable, into stone. These bodies are more or less altered from their original state, according to the different substances they have lain buried among in the earth: some of them having suffered very little change, and others being so highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone or lumps of the matter of the common pyrites; but they are generally of the external dimensions, and retain more or less of the internal figure, of the bodies into the pores of which this matter has made its way. The animal substances thus found petrified are chiefly sea-shells; the teeth, bony palates, and bones, of fish; the bones of land-animals, &c. These are found variously altered, by the insinuation of stony and mineral matter into their pores; and the substance of some of them is now wholly gone, there being only stony, sparry, or other mineral matter remaining in the shape and form.

Respecting the manner in which petrifaction is accomplished, we know but little. It has been thought by many philosophers, that this was one of the rare processes of nature; and accordingly such places as afforded a view of it, have been looked upon as great curiosities. However, it is now discovered, that petrifaction is exceedingly common; and that every kind of water carries in it some earthy particles, which being precipitated from it, become stone of a greater or lesser degree of hardness; and this quality is most remarkable in those waters which are much impregnated with selenitic matter. It has been found by observation, that iron contributes greatly to the process: and this it may do by its precipitation of any aluminous earth which happens to be dissolved in the water by means of an acid; for iron has the property of precipitating this earth. Calcareous earth, however, by being soluble in water without any acid, must contribute very much to the process of petrifaction, as they are capable of a great degree of hardness by means only of being joined

[illegible]

[illegible] found in the horizontal beds of calcareous earth, and ſometimes in beds of clay or gravel; in which caſe the nature of the petrifaction is different. As to the ſub- [illegible] tion, and they are very rare.

[illegible] ſtones are broken, the fragments of petrifactions are [illegible] There are [illegible] petrifaction, as to render it impoſſible to diſcover their origin. That [illegible] for penetrating bodies, which crumbles and ſeparates their [illegible] is a fact of which nobody ſeems to entertain any doubt. In- [illegible] liquid, inſenſibly conſume, diminiſh in bulk, and at laſt, [illegible]

A petrified ſubſtance, ſtrictly ſpeaking, is nothing more than the ſkeleton, or perhaps image, of a body which has once had life, either animal or vegetable, combined with ſome mineral. Thus petrified wood is not in that ſtate wood alone. One part of the com- [illegible] ſtances, diluted and extremely minute, which the wa- [illegible] ſelves evaporated. Theſe earthy ſubſtances, being then moulded in the ſkeleton, will be more or leſs indurated, and will appear to have its figure, its ſtructure, its ſize, in a word, the ſame general characters, the ſame ſpeci- [illegible] We [illegible] common wood is a body in which the volume of ſolid parts is greatly exceeded by that of the pores. When wood is buried in certain places, lapidific fluids, extremely divided and ſometimes coloured, inſinuate themſelves into its pores and fill them up. Theſe fluids are afterwards moulded and condenſed. The ſolid part of the wood is decompoſed and reduced into powder, which is expelled without the maſs by aqueous filtrations. In this manner, the places which were formerly occupied by the wood are now left empty in the form of pores. This operation of nature produces no apparent difference either of [illegible] than the firſt. As the pores communicate from the cir- [illegible] fluids. Such is the origin of petrifactions. They are [illegible] under the ground.

[illegible] acquainted with all their conſtituent parts. Let us take wood for an example. Wood is partly ſolid and partly porous. The ſolid parts conſiſt of a ſubſtance, [illegible] of the vegetable; the porous parts conſiſt of veſſels or interſtices which run vertically and horizontally acroſs the ligneous fibres, and which ſerve for conduct- [illegible] dric veſſels, ſome of which contain lymph, and others [illegible] vegetable. After its death they become vacant by the evaporation and abſence of the fluids with which they were formerly filled. All theſe veſſels, whether aſcending or deſcending, unite with one another, and [illegible] cording to Malpighi and Duhamel, the ligneous fibres are themſelves tubular, and afford a paſſage to certain [illegible] with utriculi of different ſhapes and ſizes. The augmentation of the trunk in thickneſs, according to [illegible] thers think that a concentric layer of ſap-wood is every [illegible] bark. But it is on all ſides agreed that the concentric layers of wood are diſtinct from one another, becauſe at the point of contact betwixt any two of them, the new veſſels, as well as new fibres, are more apparent and perceptible than they are in any other place. Having made theſe preliminary remarks on the ſtructure of vegetables, we ſhall now proceed to give an abridged account of the manner in which M. Mongez explains their petrifaction.

In proportion to the tenderneſs and bad quality of wood, it imbibes the greater quantity of water; therefore this ſort will unqueſtionably petrify more eaſily than that which is hard. It is thought that all the petrified wood ſo often found in Hungary has been origi- [illegible] wood buried in the earth; if it be very dry, it will ſuck up the moiſture which ſurrounds it like a ſponge. This moiſture, by penetrating it, will dilate all the parts of which it is compoſed. [illegible]

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be filled firſt, and then the lymphatic veſſels and thoſe which contain the *ſuccus proprius*, as they are likewiſe empty. The water which forms this moiſture keeps in diſſolution a greater or a leſs quantity of earth; and this earth, detached, and carried along in its courſe, is reduced to ſuch an attenuated ſtate, that it eſcapes our eye and keeps itſelf ſuſpended, whether by the medium of fixed air or by the motion of the water. Such is the lapidific fluid. Upon evaporation, or the departure of the menſtruum, this earth, ſand, or metal, again appears in the form of precipitate or ſediment in the cavities of the veſſels, which by degrees are filled with it. This earth is there moulded with exactneſs: The lapſe of time, the ſimultaneous and partial attraction of the particles, make them adhere to one another; the lateral ſuction of the ſurrounding fibres, the obſtruction of the moulds, and the hardening of the moulded earth, become general; and there conſiſts nothing but an earthy ſubſtance which prevents the ſinking of the neighbouring parts. If the depoſit is formed of a matter in general pretty pure, it preſerves a whiter and clearer colour than the reſt of the wood; and as the concentric layers are only perceptible and diſtinct in the wood, becauſe the veſſels are there more apparent on account of their ſize, the little earthy cylinders, in the ſtate of petrified wood, muſt be there a little larger, and conſequently muſt repreſent exactly the turnings and ſeparations of theſe layers. At the place of the utriculi, globules are obſerved, of which the ſhapes are as various as the moulds wherein they are formed. The anaſtomoſes of the proper and lymphatic veſſels, form beſides points of ſupport or reunion for this ſtony ſubſtance.

With regard to holes formed by worms in any bits of wood, before they had been buried in the earth, the lapidific fluid, in penetrating theſe great cavities, depoſits there as eaſily the earthy ſediment, which is exactly moulded in them. Theſe vermiform cylinders are ſomewhat leſs in bulk than the holes in which they are found, which is owing to the retreat of the more refined earth and to its drying up.

Let any one repreſent to himſelf this collection of little cylinders, vertical, horizontal, inclined in different directions, the ſtony maſſes of utriculi and of anaſtomoſes, and he will have an idea of the ſtony ſubſtance which forms the ground-work of petrifaction. Hitherto not a ſingle ligneous part is deſtroyed; they are all exiſting, but ſurrounded on every ſide with earthy depoſits: and that body which, during life, was compoſed of ſolid and of empty parts, is now entirely ſolid: its deſtruction and decompoſition do not take place till after the formation of theſe little depoſits. In proportion as the water abandons them, it penetrates the ligneous ſubſtance, and deſtroys it by an inſenſible fermentation. The woody fibres being decompoſed, form in their turn voids and interſtices, and there remains in the whole piece nothing but little ſtony cylinders. But in proportion as theſe woody fibres diſappear, the ſurrounding moiſture, loaded with earth in the ſtate of diſſolution, does not fail to penetrate the piece of wood, and to remain in its new cavities. The new depoſite aſſumes exactly the form of decompoſed fibres; it envelopes in its turn the little cylinders which were formed in their cavities, and ends by incorporating with them. We may ſuppoſe here, that in proportion as it decompoſes, there is a reaction of the ligneous part againſt the lapidific fluid: from this reaction a colour ariſes which ſtains more or leſs the new depoſit; and this colour will make it eaſily diſtinguiſhable from that which has been laid in the inſide of the veſſels. In all petrified wood this ſhade is generally perceptible.

We have then, ſays M. Mongez, four diſtinct epochs in the proceſs by which nature converts a piece of wood into ſtone, or, to ſpeak more juſtly, by which ſhe ſubſtitutes a ſtony depoſit in its place: 1. Perfect vegetable wood, that is to ſay, wood compoſed of ſolid and of empty parts, of ligneous fibres, and of veſſels. 2. Wood having its veſſels obſtructed and choaked up by an earthy depoſit, while its ſolid parts remain unaltered. 3. The ſolid parts attacked and decompoſed, forming new cavities betwixt the ſtony cylinders, which remain in the ſame ſtate, and which ſupport the whole maſs. 4. Theſe new cavities filled with new depoſits, which incorporate with the cylinders, and compoſe nothing elſe but one general earthy maſs repreſenting exactly the piece of wood.

Among the petrifactions of vegetables called *dendrolites*, are found parts of ſhrubs, ſtems, roots, portions of the trunk, ſome fruits, &c. We muſt not, however, confound the impreſſions of moſſes, ferns, and leaves, or incruſtations, with petrifactions.

Among the petrifactions of animals, we find ſhells, cruſtaceous animals, polyparii, ſome worms, the bony parts of fiſhes and of amphibious animals, few or no real inſects, rarely birds and quadrupeds, together with the bony portions of the human body. The cornua ammonis are petrified ſhell-fiſh; and with regard to figured and accidental bodies, theſe are *luſus naturæ*.

In order, ſays M. Bertrand, in his *Dictionnaire des Foſſiles*, that a body ſhould become petrified, it is neceſſary that it be, 1. Capable of preſervation under ground: 2. That it be ſheltered from the air and running water (the ruins of Herculaneum prove that bodies which have no connection with free air, preſerve themſelves untouched and entire). 3. That it be ſecured from corroſive exhalations. 4. That it be in a place where there are vapours or liquids, loaded either with metallic or ſtony particles in a ſtate of diſſolution, and which, without deſtroying the body, penetrate it, impregnate it, and unite with it in proportion as its parts are diſſipated by evaporation.

It is a queſtion of great importance among naturaliſts, to know the time which Nature employs in petrifying bodies of an ordinary ſize.—It was the wiſh of the emperor, duke of Lorraine, that ſome means ſhould be taken for determining this queſtion. M. le Chevalier de Baillu, director of the cabinet of natural hiſtory of his imperial majeſty, and ſome other naturaliſts, had, ſeveral years ago, the idea of making a reſearch which might throw ſome light upon it. His imperial majeſty being informed by the unanimous obſervations of modern hiſtorians and geographers, that certain pillars which are actually ſeen in the Danube in Gervia, near Belgrade, are remains of the bridge which Trajan conſtructed over that river, preſumed that theſe pillars having been preſerved for ſo many ages behoved to be petrified, and that they would furniſh ſome information with regard to the time which nature employs in changing wood into ſtone. The emperor thinking this hope well founded, and wiſhing to ſatisfy his curioſity, ordered his ambaſſador at the court of Conſtantinople

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to aſk permiſſion to take up from the Danube one of the pillars of Trajan's bridge. The petition was granted, and one of the pillars was accordingly taken up; from which it appeared that the petrifaction had only advanced three fourths of an inch in the ſpace of 1500 years. There are, however, certain waters in which this tranſmutation is more readily accompliſhed.—Petrifactions appear to be formed more ſlowly in earths that are porous and in a larger degree moiſt than in water itſelf.

When the foundations of the city of Quebec in Canada were dug up, a petrified ſavage was found among the laſt beds to which they proceeded. Although there was no idea of the time at which this man had been buried under the ruins, it is however true, that his quiver and arrows were ſtill well preſerved. In digging a lead-mine in Derbyſhire, in 1744, a human ſkeleton was found among ſtags horns. It is impoſſible to ſay how many ages this carcaſe had lain there. In 1695 the entire ſkeleton of an elephant was dug up near Tonna in Thuringia. Some time before this epoch the petrified ſkeleton of a crocodile was found in the mines of that country. We might cite another fact equally curious which happened at the beginning of the laſt century. John Munte, curate of Skegarp in Scania, and ſeveral of his pariſhioners, wiſhing to procure turf from a drained marſhy ſoil, found, ſome feet below ground, an entire cart with the ſkeletons of the horſes and carter. It is preſumed that there had formerly been a lake in that place, and that the carter attempting to paſs over on the ice, had by that means probably periſhed. In fine, wood partly foſſil and partly coaly, has been found at a great depth, in the clay of which tile was made for the abbey of Fontenay. It is but very lately that foſſil wood was diſcovered at the depth of 75 feet in a well betwixt Iſſi and Vauvres near Paris. This wood was in ſand betwixt a bed of clay and pyrites, and water was found four feet lower than the pyrites. M. de Laumont, inſpector general of the mines, ſays (*Journal de Phyſique*, Mai 1736), that in the lead-mine at Pontpéan near Rennes, is a fiſſure, perhaps the only one of its kind. In that fiſſure, ſea-ſhells, rounded pebbles, and an entire beech, have been found 240 feet deep. This beech was laid horizontally in the direction of the fiſſure. Its bark was converted into pyrites, the ſap-wood into jet, and the centre into coal.

A great many pieces of petrified wood are found in different counties of France and Savoy. In Cobourg in Saxony, and in the mountains of Miſnia, trees of a conſiderable thickneſs have been taken from the earth, which were entirely changed into a very fine agate, as alſo their branches and their roots. In ſawing them, the annual circles of their growth have been diſtinguiſhed. Pieces have been taken up, on which it was diſtinctly ſeen that they had been gnawed by worms; others bear viſible marks of the hatchet. In fine, pieces have been found which were petrified at one end, while the other ſtill remained in the ſtate of wood fit for being burned. It appears then that petrified wood is a great deal leſs rare in nature than is commonly imagined.

Cronſtedt has excluded petrifactions from any place in the body of his ſyſtem of mineralogy, but takes notice of them in his appendix. He diſtinguiſhes them by the name of *Mineralia Larvata*, and defines them to be "mineral bodies in the form of animals or vegetables." The moſt remarkable obſervations concerning them, according to Mr Kirwan, who differs in ſome particulars from Mongez, are as follow. 1. Thoſe of ſhells are found on or near the ſurface of the earth; thoſe of fiſh deeper; and thoſe of wood deepeſt of all. Shells in ſubſtance are found in vaſt quantities, and at conſiderable depths. 2. The ſubſtances moſt ſuſceptible of petrifaction are thoſe which moſt reſiſt the putrefactive proceſs; of which kind are ſhells, the harder kinds of wood, &c.; while the ſofter parts of animals, which eaſily putrefy, are ſeldom met with in a petrified ſtate. 3. They are moſt commonly found in ſtrata of marl, chalk, limeſtone, or clay: ſeldom in ſandſtone, ſtill more ſeldom in gypſum; and never in gneiſs, granite, baſaltes, or ſchoerl. Sometimes they are found in pyrites, and ores of iron, copper, and ſilver; conſiſting almoſt always of that kind of earth or other mineral which ſurrounds them; ſometimes of ſilex, agate, or cornelian. 4. They are found in climates where the animals themſelves could not have exiſted. 5. Thoſe found in ſlate or clay are compreſſed and flattened.

The different ſpecies of petrifactions, according to Cronſtedt, are,

I. *Terræ Larvatæ;* extraneous bodies changed into a limy ſubſtance, or calcareous changes. Theſe are, 1. Looſe or friable. 2. Indurated. The former are of a chalky nature in form of vegetables or animals; the ſecond filled with ſolid limeſtone in the ſame forms. Some are found entirely changed into a calcareous ſpar. All of them are found in France, Sweden, and other countries in great plenty.

On theſe petrifactions Cronſtedt obſerves, that ſhells and corals are compoſed of limy matter even when ſtill inhabited by their animals, but they are claſſed among the petrifactions as ſoon as the calcareous particles have obtained a new arrangement; for example, when they have become ſparry; filled with calcareous earth either hardened or looſe, or when they lie in the ſtrata of the earth. "Theſe, ſays he, form the greateſt part of the foſſil collections which are ſo induſtriouſly made, often without any regard to the principal and only uſe they can be of, viz. that of enriching zoology. Mineralogiſts are ſatisfied with ſeeing the poſſibility of the changes the limeſtone undergoes in regard to its particles; and alſo with receiving ſome inſight into the alteration which the earth has been ſubject to from the ſtate of the ſtrata which are now found in it." The calcined ſhells, where the petrifactions are of a limy or chalky nature, anſwer extremely well as a manure; but the indurated kind ſerve only for making grottoes. Gypſeous petrifactions are extremely rare; however, Chardin informs us that he had ſeen a lizard incloſed in a ſtone of that kind in Perſia.

II. Larvæ, or bodies changed into a flinty ſubſtance. Theſe are all indurated, and are of the following ſpecies. 1. Cornelians in form of ſhells from the river Tomm in Siberia. 2. Agate in form of wood; a piece of which is ſaid to be in the collection of the Count de Teſſin. 3. Coralloids of white flint (*Millepora*) found in Sweden. 4. Wood of yellow flint found in Italy, in Turkey near Adrianople, and produced by the water of Lough-neagh in Ireland.

III. *Larvæ argillaceæ*; where the bodies appear to be

Petrifaction.

be changed into clay. Theſe are found either friable, or indurated. Of the former kind is a piece of porcelain clay met with in a certain collection, with all the marks of the root of a tree upon it. Of the latter kind is the oſteocolla; which is ſaid to be the roots of the poplar-tree changed, and ſaid to conſiſt of any calcareous ſubſtance. A ſort of foſſil ivory, with all the properties of clay, is ſaid likewiſe to be found in ſome places.

IV. *Larvæ ſalitæ*; where the ſubſtances are impregnated with great quantities of ſalts. Human bodies have been twice found impregnated with vitriol of iron in the mine of Fahlun, in the province of Dalarne in Sweden. One of them was kept for ſeveral years in a glaſs caſe, but at laſt began to moulder and fall to pieces. Turf and roots of trees are likewiſe found in water ſtrongly impregnated with vitriol. They do not flame, but look like a coal in a ſtrong fire; neither do they decay in the air.

V. Bodies penetrated by mineral inflammable ſubſtances. 1. By pit coal, ſuch as wood; whence ſome have imagined coal to have been originally produced from wood. Some of theſe ſubſtances are fully ſaturated with the coaly matter; others not. Among the former Cronſtedt reckons jet; among the latter the ſubſtance called *mumia vegetabilis*, which is of a looſe texture, reſembling amber, and may be uſed as ſuch. 2. Thoſe penetrated by aſphaltum or rock-oil. The only example of theſe given by our author is a kind of turf in the province of Skone in Sweden. The Egyptian mummies, he obſerves, cannot have any place among this ſpecies, as they are impregnated artificially with aſphaltum, in a manner ſimilar to what happens naturally with the wood and coaly matter in the laſt ſpecies. 3. Thoſe impregnated with ſulphur which has diſſolved iron, or with *pyrites*. Human bodies, bivalve and univalve ſhells and inſects, have been all found in this ſtate; and the laſt are found in the alum ſlate at Andrarum, in the province of Skone in Sweden.

VI. *Larvæ metalliferæ*; where the bodies are impregnated with metals. Theſe are, 1. Covered with native ſilver; which is found on the ſurface of ſhells in England. 2. Where the metal is mineralized with copper and ſulphur. Of this kind is the fahlertz or gray ſilver ore, in the ſhape of ears of corn, and ſuppoſed to be vegetables, found in argillaceous ſlate at Frankenberg and Tahlitteren in Heſſe. 3. *Larvæ cupriferæ*, where the bodies are impregnated with copper. To this ſpecies principally belong the turquoiſe or Turkey ſtones, improperly ſo called; being ivory and bones of the elephant or other animals impregnated with copper. At Simore in Languedoc there are bones of animals dug up, which, during calcination, aſſume a blue colour; but according to Cronſtedt it is not probable that theſe owe their colour to copper. 3. With mineralized copper. Of theſe our author gives two examples. One is where the copper is mineralized with ſulphur and iron, forming a yellow marcaſitical ore. With this ſome ſhells are impregnated which lie upon a bed of loadſtone in Norway. Other petrifactions of this kind are found in the form of fiſh in different parts of Germany. The other kind is where the copper is impregnated with ſulphur and ſilver. Of this kind is the gray ſilver ore, like ears of corn, found in the ſlate quarries at Heſſe. 4. *Larvæ ferriferæ*, with iron in form of a calx, which has filled the place or ſhape of calcareous bodies. Theſe are either looſe or indurated. Of the looſe kind are the roots of trees found in the lake Langelmas in Finland. The indurated kinds are commonly ſtratified in trees, and found at Orsillen in Dalarne. 5. Where the iron is mineralized, as in the pyritaceous larvæ, already deſcribed.

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VII. Where the bodies are tending to decompoſition, or in a way of deſtruction. Among theſe, our author enumerates MOULD and TURF. See likewiſe the article FOSSIL.

We ſhall add the following deſcription of a very curious animal petrifaction. The Abbé de Sauvages, celebrated for his refined taſte and knowledge in natural hiſtory, in a tour through Languedoc, between Alais and Uzes, met with a narrow vein of no more than two toiſes wide, which croſſes the road, and is bordered on one ſide by a grey dirty ſoil, and on the other by a dry ſandy earth, each of a vaſt extent, and on a level with the narrow vein which ſeparates them. In this narrow vein only are contained petrified ſhells, cemented together by a whitiſh marl. They are in prodigious plenty; among which there is one ſpecies which the abbé does not remember to have known to have been anywhere deſcribed, and may probably be a new acquiſition to natural hiſtory.

This ſhell has the ſhape of a horn, ſomewhat incurvated towards the baſe. It ſeems compoſed of ſeveral cups, let into each other, which are ſometimes found ſeparate. They have all deep channels, which extend, as in many other ſhells, from the baſe to the aperture; the projecting ribs which form theſe channels are moſtly worn away, being rarely to be found entire. Sometimes ſeveral are grouped together; and as a proof that they are not a fortuitous aſſemblage cauſed by the petrifaction, they are fixed together through their whole length, in ſuch ſort, that their baſe and aperture are regularly turned the ſame way. The abbé ſhould have referred this to the genus which Linnæus and the Marquis d'Argenville named *dentalis*, had they not been let into each other. He found ſome of them whoſe aperture or hollow was not ſtopped up by the petrifaction, and ſeemed as cones adapted to one another, forming a row of narrow cells, ſeparated by a very thin partition: this row occupied not more than one half of the cavity of the ſhell.

Our article has already extended to ſuch a length as to preclude any further additions; we cannot, however, finiſh it without obſerving, that foſſil bones are very common in Dalmatia. They are of various kinds, and in their nature apparently very extraordinary; but we have found no tolerable account or probable conjecture of their origin. Vitaliano Donati of Padua, in his *Saggio ſopra la ſtoria naturale dell' Adriatico*, was the firſt who took notice of them; and Fortis, in his Travels into Dalmatia, has given a copious account of them. They are moſt common in the iſlands of *Cherſo* and *Oſero*. See Fortis's Travels into Dalmatia; and thoſe of our readers who wiſh to proſecute this inquiry may conſult with advantage Parkinſon's Organic Remains of a Former World, two vols. 4to.

PETRIFIED CITY. The ſtory of a petrified city is well known all over Africa, and has been believed by many conſiderable perſons even in Europe. Louis XIV. was ſo fully perſuaded of its reality that he ordered

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dered his ambaſſador to procure the body of a man petrified from it at any price. Dr Shaw's account of this affair is as follows. "About 40 years ago (now more than 70), when M. le Maire was the French conſul at Tripoli, he made great inquiries, by order of the French court, into the truth of the report concerning a petrified city at Ras Sem; and amongſt other very curious accounts relating to this place, he told me a remarkable circumſtance, to the great diſcredit, and even confutation, of all that had been ſo poſitively advanced with regard to the petrified bodies of men, children, and other animals.

"Some of the janizaries, who, in collecting tribute, traverſe the diſtrict of Ras Sem, promiſed him, that, as an adult perſon would be too cumberſome, they would undertake, for a certain number of dollars, to bring him from thence the body of a little child. After a great many pretended difficulties, delays, and diſappointments, they produced at length a little Cupid, which they had found, as he learned afterwards, among the ruins of Leptis; and, to conceal the deceit, they broke off the quiver, and ſome other of the diſtinguiſhing characteriſtics of that deity. However, he paid them for it, according to promiſe, 1000 dollars, which is about 150 l. ſterling of our money, as a reward for their faithful ſervice and hazardous undertaking; having run the riſk, as they pretended, of being ſtrangled if they ſhould have been diſcovered in thus delivering up to an infidel one of thoſe unfortunate Mahometans, as they take them originally to have been.

"But notwithſtanding this cheat and impoſition had made the conſul deſiſt from ſearching after the petrified bodies of men and other animals; yet there was one matter of fact, as he told me, which ſtill very ſtrangely embarraſſed him, and even ſtrongly engaged him in favour of the current report and tradition. This was ſome little loaves of bread, as he called them, which had been brought to him from that place. His reaſoning, indeed thereupon, provided the pretended matter of fact had been clear and evident, was juſt and ſatisfactory; for where we find loaves of bread, there, as he urged, ſome perſons muſt been employed in making them, as well as others for whom they were prepared. One of theſe loaves he had, among other petrifications, very fortunately brought with him to Cairo, where I ſaw it, and found it to be an echinites of the diſcoid kind, of the ſame faſhion with one I had lately found and brought with me from the deſerts of Marah. We may therefore reaſonably conclude, that there is nothing to be found at Ras Sem, unleſs it be the trunks of trees, echinites, and ſuch petrifications as have been diſcovered at other places.

"M. le Maire's inquiries, which we find were ſupported by the promiſe and performance of great rewards, have brought nothing further to light. He could never learn that any traces of walls, or buildings, or animals, or utenſils, were ever to be ſeen within the verge of theſe pretended petrifications. The like account I had from a Sicilian renegado, who was the janizary that attended me whilſt I was in Egypt; and as in his earlier years he had been a ſoldier of Tripoli, he aſſured me that he had been ſeveral times at Ras Sem. This I had confirmed again in my return from the Levant by the interpreter of the Britiſh factory at Tunis, who was likewiſe a Sicilian renegado; and being the libertus or freedman of the baſhaw of Tripoli, was preferred by him to be the bey or viceroy of the province of Darna, where Ras Sem was immediately under his juriſdiction. His account was likewiſe the ſame; neither had he ever ſeen, in his frequent journeys over this diſtrict, any other petrifications than what are above mentioned. So that the petrified city, with its walls, caſtles, ſtreets, ſhops, cattle, inhabitants, and utenſils, were all of them at firſt the mere inventions of the Arabs, and afterwards propagated by ſuch perſons, who, like the Tripoli ambaſſador, and his friend above mentioned, were credulous enough to believe them.

Petrified City, Petrobruſſians.

"However, there is one remarkable circumſtance relating to Ras Sem that deſerves well to be recorded. When the winds have blown away the billows of ſand, which frequently cover and conceal theſe petrifications, they diſcover, in ſome of the lower and more depreſſed places of this diſtrict, ſeveral little pools of water, which is uſually of ſo ponderous a nature, that, upon drinking it, it paſſes through the body like quickſilver. This perhaps may be that petrifying fluid which has all along contributed to the converſion of the palm trees and the echini into ſtone: for the formation not only of theſe, but of petrifications of all kinds, may be entirely owing to their having firſt of all lodged in a bed of loam, clay, ſand, or ſome other proper nidus or matrix, and afterwards gradually been acted upon and pervaded by ſuch a petrifying fluid as we may ſuppoſe this to be."

To this account it may not be amiſs to ſubjoin the memorial of Caſſem Aga, the Tripoli ambaſſador at the court of Britain. The city, he ſays, is ſituated two days journey ſouth from Onguela, and 17 days journey from Tripoli by caravan to the ſouth-eaſt. "As one of my friends (ſays the ambaſſador) deſired me to give him in writing an account of what I knew touching the petrified city, I told him what I had heard from different perſons, and particularly from the mouth of one man of credit who had been on the ſpot: that is to ſay, that it was a very ſpacious city, of a round form, having great and ſmall ſtreets therein, furniſhed with ſhops, with a vaſt caſtle magnificently built: that he had ſeen there ſeveral ſorts of trees, the moſt part olives and palms, all of ſtone, and of a blue or rather lead colour: that he ſaw alſo figures of men in a poſture of exerciſing their different employments; ſome holding in their hands ſtuffs, others bread, every one doing ſomething, even women ſuckling their children, and in the embraces of their huſbands, all of ſtone: that he went into the caſtle by three different gates, though there were many more, where he ſaw a man lying upon a bed of ſtone: that there were guards at the gates with pikes and javelins, in their hands: in ſhort, that he ſaw in this wonderful city many ſorts of animals, as camels, oxen, horſes, aſſes, ſheep, and birds, all of ſtone, and of the colour abovementioned."

We have ſubjoined this account, becauſe it ſhows in ſtriking colours the amazing credulity of mankind, and the avidity with which they ſwallow the marvellous, and the difficulty of diſcovering the truth reſpecting places or things at a diſtance from us.

PETROBRUSSIANS, a religious ſect, which had its riſe in France and the Netherlands about the year 1110. The name is derived from *Peter Bruys*, a Provençal, who made the moſt laudable attempt to reform

Petrobruſſians ‖ Petronius.

the abuſes and remove the ſuperſtition that diſgraced the beautiful ſimplicity of the goſpel. His followers were numerous; and for 20 years his labour in the miniſtry was exemplary and unremitted. He was, however, burnt in the year 1130 by an enraged populace ſet on by the clergy.

The chief of Bruys's followers was a monk named *Henry*; from whom the Petrobruſſians were alſo called *Henricians*. Peter the Venerable, abbot of Clugny, has an expreſs treatiſe againſt the Petrobruſſians; in the preface to which he reduces their opinions to five heads. 1. They denied that children before the age of reaſon can be juſtified by baptiſm, in regard it is our own faith that ſaves by baptiſm. 2. They held that no churches ſhould be built, but that thoſe that already are ſhould be pulled down; an inn being as proper for prayers as a temple, and a ſtable as an altar. 3. That the croſs ought to be pulled down and burnt, becauſe we ought to abhor the inſtruments of our Saviour's paſſion. 4. That the real body and blood of Chriſt are not exhibited in the euchariſt, but merely repreſented by their figures and ſymbols. 5. That ſacrifices, alms, prayers, &c. do not avail the dead. F. Langlois objects Manicheiſm to the Petrobruſſians; and ſays, they maintained two gods, the one good, the other evil: but this we rather eſteem an effect of his zeal for the catholic cauſe, which determined him to blacken the adverſaries thereof, than any real ſentiment of the Petrobruſſians.

PETROJOANNITES, were followers of Peter John, or Peter Joannis, *i. e.* Peter the ſon of John, who flouriſhed in the 12th century. His doctrine was not known till after his death, when his body was taken out of his grave and burnt. His opinions were, that he alone had the knowledge of the true ſenſe wherein the apoſtles preached the goſpel; that the reaſonable ſoul is not the form of man; that there is no grace infuſed by baptiſm; and that Jeſus Chriſt was pierced with a lance on the croſs before he expired.

PETROLEUM, or ROCK OIL; a thick oily ſubſtance exuding from the earth, and collected on the ſurface of wells in many parts of the world. See MINERALOGY *Index*.

PETROMYZON, the LAMPREY, a genus of fiſhes belonging to the order *Cartilaginei*. See ICHTHYOLOGY *Index*.

PETRONIUS was a renowned Roman ſenator. When governor of Egypt, he permitted Herod, king of the Jews, to purchaſe in Alexandria any quantity of corn which he ſhould judge neceſſary for the ſupply of his ſubjects, who were afflicted with a ſevere famine. When Tiberius died, Caius Caligula, who ſucceeded him, took from Vitellius the government of Syria, and gave it to Petronius, who diſcharged the duties of his office with dignity and honour. From his inclination to favour the Jews, he run the riſk of loſing the emperor's friendſhip and his own life; for when that prince gave orders to have his ſtatue depoſited in the temple of Jeruſalem, Petronius, finding that the Jews would rather ſuffer death than ſee that ſacred place profaned, was unwilling to have recourſe to violent meaſures; and therefore preferred a moderation, dictated by humanity, to a cruel obedience. We muſt not confound him with another of the ſame name, viz. Petronius Granius, who was a centurion in the eighth legion, and ſerved under Cæſar in the Gallic war. In his voyage to Africa, of which country he had been appointed quæſtor, the ſhip in which he ſailed was taken by Scipio, who cauſed all the ſoldiers to be put to the ſword, and promiſed to ſave the quæſtor's life, provided that he would renounce Cæſar's party. To this propoſal Petronius replied, that "Cæſar's officers were accuſtomed to grant life to others, and not to receive it;" and, at the ſame time, he ſtabbed himſelf with his own ſword.

Petronius Arbiter.

PETRONIUS Arbiter, *Titus*, a celebrated critic and polite writer of antiquity, the favourite of Nero, ſuppoſed to be the ſame mentioned by Tacitus in the 16th book of his Annals. He was proconſul of Bithynia, and afterwards conſul, and appeared capable of the greateſt employments. He was one of Nero's principal confidants, and in a manner the ſuperintendant of his pleaſures; for that prince thought nothing agreeable or delightful but what was approved by Petronius. The great favour ſhown him drew upon him the envy of Tigellinus, another of Nero's favourites, who accuſed him of being concerned in a conſpiracy againſt the emperor; on which Petronius was ſeized, and was ſentenced to die. He met death with a ſtriking indifference, and ſeems to have taſted it nearly as he had done his pleaſures. He would ſometimes open a vein and ſometimes cloſe it, converſing with his friends in the meanwhile, not on the immortality of the ſoul, which was no part of his creed, but on topics which pleaſed his fancy, as of love-verſes, agreeable and paſſionate airs; ſo that it has been ſaid "his dying was barely ceaſing to live." Of this diſciple of Epicurus, Tacitus gives the following character: "He was (ſays he) neither a ſpendthrift nor a debauchee, like the generality of thoſe who ruin themſelves; but a refined voluptuary, who devoted the day to ſleep, and the night to the duties of his office, and to pleaſure." This courtier is much diſtinguiſhed by a ſatire which he wrote, and ſecretly conveyed to Nero; in which he ingeniouſly deſcribes, under borrowed names, the character of this prince. Voltaire is of opinion that we have no more of this performance but an extract made by ſome obſcure libertine, without either taſte or judgement. Peter Petit diſcovered at Traw in Dalmatia, in 1665, a conſiderable fragment containing the ſequel of Trimalcion's Feaſt. This fragment, which was printed the year after at Padua and at Paris, produced a paper war among the learned. While ſome affirmed that it was the work of Petronius, and others denied it to be ſo, Petit continued to aſſert his right to the diſcovery of the manuſcript, and ſent it to Rome, where it was acknowledged to be a production of the 15th century. The French critics, who had attacked its authenticity, were ſilent from the moment it was depoſited in the royal library. It is now generally attributed to Petronius, and found in every ſubſequent edition of the works of that refined voluptuary. The public did not form the ſame favourable opinion of ſome other fragments, which were extracted from a manuſcript found at Belgrade in 1688, and printed at Paris by Nodot in 1694, though they are aſcribed by the editor Charpentier, and ſeveral other learned men, to Petronius; yet, on account of the Galliciſms, and other barbarous expreſſions with which they abound, they have generally been conſidered as unworthy of that author. His genuine works are, 1. A Poem on the civil war between Cæſar and Pompey, tranſlated into proſe by Abbé de Marolles, and into French verſe by Preſident Bouhier, 1737, in 4to. Petronius, full of fire and enthuſiaſm, and diſguſted with Lucan's flowery language, oppoſed Pharſalia to Pharſalia; but his work, though evidently ſuperior to the other in ſome reſpects, is by no means in the true ſtyle of epic poetry. 2. A Poem on the Education of the Roman Youth. 3. Two Treatiſes; one upon the Corruption of Eloquence, and the other on the Cauſes of the Decay of Arts and Sciences. 4. A Poem on the Vanity of Dreams. 5. The Shipwreck of Licas. 6. Reflections on the Inconſtancy of Human Life. And, 7. Trimalcion's Banquet. To this laſt performance morality is not much indebted. It is a deſcription of the pleaſures of a corrupted court; and the painter is rather an ingenious courtier than a perſon whoſe aim is to reform abuſes. The beſt editions of Petronius are thoſe publiſhed at Venice, 1499, in 4to; at Amſterdam, 1669, in 8vo, *cum notis variorum*; Ibid. with Botchius's notes, 1677, in 24to; and 1700, two vols. in 24to. The edition of *variorum* was reprinted in 1743, in two vols. 4to, with the learned Peter Burman's commentaries. Petronius died in the year 65 or 66.

PETRONIUS *Maximus*, was born in the year 395, of an illuſtrious family, being at firſt a ſenator and conſul of Rome. He put on the imperial purple in 455, after having effected the aſſaſſination of Valentinian III. In order to eſtabliſh himſelf upon the throne, he married Eudoxia the widow of that unfortunate prince; and as ſhe was ignorant of his villany, he confeſſed to her, in a tranſport of love, that the ſtrong deſire he had of being her huſband, had made him commit this atrocious crime. Whereupon Eudoxia privately applied to Genſeric, king of the Vandals, who coming into Italy with a very powerful army, entered Rome, where the uſurper then was. The unhappy wretch endeavoured to make his eſcape; but the ſoldiers and people, enraged at his cowardice, fell upon him, and overwhelmed him with a ſhower of ſtones. His body was dragged through the ſtreets of the city for three days; and, after treating it with every mark of diſgrace, they threw it into the Tiber the 12th of June the ſame year, 455. He reigned only 77 days. He had ſome good qualities. He loved and cultivated the ſciences. He was prudent in his councils, circumſpect in his actions, equitable in his judgements; a facetious companion, and ſteady friend. He had the good fortune to win the affections of every body, while he remained a private character; but as a prince, he was ſo much the more deteſtable, in that, after he had obtained the throne by villany, he kept poſſeſſion of it only by violence. The crown was ſcarcely on his head before it appeared to him an inſupportable burden. "Happy Democles (exclaimed he in his deſpair), thou wert a king during a ſingle entertainment."

PETROSA OSSA, in *Anatomy*, a name given to the fourth and fifth bones of the cranium, called alſo *oſſa temporum* and *oſſa ſquamoſa*; the ſubſtance whereof, as their firſt and laſt names expreſs, is ſquamoſe and very hard. See ANATOMY *Index*.

PETROSELINUM (APIUM PETROSELINUM, Lin.) *Parſley*, a plant which is commonly cultivated for culinary purpoſes. See BOTANY and GARDENING *Index*.

PETTEIA, in the ancient muſic, a term to which we have no one correſponding in our language.

The melopœia, or the art of arranging ſounds in ſucceſſion ſo as to make melody, is divided into three parts, which the Greeks call *lepſis*, *mixis*, and *chreſis*; the Latins *ſumptio*, *mixio*, and *uſus*; and the Italians *preſa*, *meſcolamento*, and *uſo*. The laſt of theſe is called by the Greeks πεττεια, and by the Italians *petteia*; which therefore means the art of making a juſt diſcernment of all the manners of ranging or combining ſounds among themſelves, ſo as they may produce their effect, *i. e.* may expreſs the ſeveral paſſions intended to be raiſed. Thus it ſhows what ſounds are to be uſed, and what not; how often they are ſeverally to be repeated; with which to begin, and with which to end; whether with a grave ſound to riſe, or an acute one to fall, &c. The petteia conſtitutes the manners of the muſic; chooſes out this or that paſſion, this or that motion of the ſoul, to be awakened; and determines whether it be proper to excite it on this or that occaſion. The petteia, therefore, is in muſic much what the manners are in poetry.

It is not eaſy to diſcover whence the denomination ſhould have been taken by the Greeks, unleſs from πεττεια, their game of cheſs, the muſical petteia being a ſort of combination and arrangement of ſounds, as cheſs is of pieces called πεττοι, *calculi*, or "cheſs-men."

PETTY, SIR WILLIAM, ſon of Anthony Petty, a clothier, was born at Rumſey, a ſmall town in Hampſhire, in 1623; and while a boy took great delight in ſpending his time among the artificers, whoſe trades he could work at when but twelve years of age. Then he went to the grammar ſchool there: at fifteen he was maſter of the Latin, Greek, and French tongues, and of arithmetic and thoſe parts of practical geometry and aſtronomy uſeful to navigation. Soon after he went to Caen in Normandy, and Paris, where he ſtudied anatomy, and read Veſalius with Mr Hobbes. Upon his return to England, he was preferred in the king's navy. In 1643, when the war between the king and parliament grew hot, he went into the Netherlands and France for three years; and having vigorouſly proſecuted his ſtudies, eſpecially in phyſic, at Utrecht, Leyden, Amſterdam, and Paris, he returned home to Rumſey. In 1647, he obtained a patent to teach the art of double writing for ſeventeen years. In 1648, he publiſhed at London "Advice to Mr Samuel Hartlib, for the advancement of ſome particular parts of learning." At this time he adhered to the prevailing party of the kingdom; and went to Oxford, where he taught anatomy and chemiſtry, and was created a doctor of phyſic. In 1650, he was made profeſſor of anatomy there; and ſoon after a member of the college of phyſicians in London. The ſame year he became phyſician to the army in Ireland; where he continued till 1659, and acquired a great fortune. After the reſtoration, he was introduced to King Charles II. who knighted him in 1661. In 1662, he publiſhed "A Treatiſe of taxes and contributions." Next year he was greatly applauded in Ireland for his invention of a double-bottomed ſhip. He died at London, in 1687, of a gangrene in the foot, occaſioned by the ſwelling of the gout.

The character of his genius is ſufficiently ſeen in his writings, which were much more numerous than thoſe we have mentioned above. Among theſe, it is ſaid, he wrote the hiſtory of his own life, which unqueſtionably contained a full account of his political and religious principles, as may be conjectured from what he has left us upon thoſe ſubjects in his will. In that he has theſe remarkable words: "As for legacies to the poor, I am at a ſtand; and for beggars by trade and election, I give them nothing: as for impotents by the hand of God, the public ought to maintain them: as for thoſe who can get no work, the magiſtrates ſhould cauſe them to be employed, which may be well done in Ireland, where are fifteen acres of improveable land for every head: as for priſoners for crimes by the king, or for debt by their proſecutors, thoſe who compaſſionate the ſufferings of any object, let them relieve themſelves by relieving ſuch ſufferers; that is, give them alms (A), &c. I am, contented, that I have aſſiſted all my poor relations, and put many into a way of getting their own bread, and have laboured in public works and inventions, and have ſought out real objects of charity; and do hereby conjure all who partake of my eſtate, from time to time to do the ſame at their peril. Nevertheleſs, to anſwer cuſtom, and to take the ſure ſide, I give twenty pounds to the moſt wanting of the pariſh wherein I die." As for his religion, he ſays, "I die in the profeſſion of that faith, and in the practice of ſuch worſhip, as I find eſtabliſhed by the laws of my country; not being able to believe what I myſelf pleaſe, nor to worſhip God better than by doing as I would be done unto, and obſerving the laws of my country, and expreſſing my love and honour to Almighty God, by ſuch ſigns and tokens as are underſtood to be ſuch by the people with whom I live." He died poſſeſſed of a very large fortune, and his family was afterwards ennobled.

The variety of purſuits in which Sir William Petty was engaged, ſhows him to have had a genius capable of any thing to which he choſe to apply it; and it is very extraordinary, that a man of ſo active and buſy a ſpirit could find time to write ſo many things as it appears he did.

Petty, any thing little or diminutive, when compared with another.

Petty-Bag, an office in chancery; the three clerks of which record the return of all inquiſitions out of every county, and make all patents of comptrollers, gaugers, cuſtomers, &c.

Petty-Chaps. See Motacilla, Ornithology *Index*.

Petty-Fogger, a little tricking ſolicitor or attorney, without either ſkill or conſcience.

Petty, or *Petit*, *Larceny*. See Larceny.

Petty-Patees, among confectioners, a ſort of ſmall pies, made of a rich cruſt filled with ſweetmeats.

Petty-Singles, among falconers, are the toes of a hawk.

Petty-Tally, in the ſea language, a competent allowance of victuals, according to the number of the ſhip's company.

Petty, or *Petit*, *Treaſon*. See Treason.

PETUNSE, in *Natural Hiſtory*, one of the two ſubſtances of which porcelain or china-ware is made. The petunſe is a coarſe kind of flint or pebble, the ſurface of which is not ſo ſmooth when broken as that of our common flint. See Porcelain.

PETWORTH, in Suſſex in England, five miles from Midhurſt and the Suſſex Downs, and 49 from London, is a large, populous, and handſome town. It is adorned with ſeveral ſeats of gentlemen, particularly the magnificent ſeat of the Percies, earls of Northumberland, many of whom lie buried in a ſeparate vault of its church. In the duke of Somerſet's armory, in this place, there is a ſword which, by circumſtances, appears to have been the weapon of the famous Henry Hotſpur, though it is leſs unwieldy than other ancient ſwords.

PEUCEDANUM, or sulphur-wort, a genus of plants belonging to the pentandria claſs, and in the natural method ranking under the 45th order, *Umbellatæ*. See Botany *Index*.

PEUTEMAN, Peter, was born at Rotterdam in 1650, and was a good painter of inanimate objects; but the moſt memorable particular relative to this artiſt was the incident which occaſioned his death.

He was requeſted to paint an emblematical picture of mortality, repreſenting human ſkulls and bones, ſurrounded with rich gems and muſical inſtruments, to expreſs the vanity of this world's pleaſures, amuſements, or poſſeſſions; and that he might imitate nature with the greater exactneſs, he went into an anatomy room, where ſeveral ſkeletons hung by wires from the ceiling, and bones, ſkulls, &c. lay ſcattered about; and immediately prepared to make his deſigns. *Dict. of Painters.*

While he was thus employed, either by fatigue, or by intenſe ſtudy, inſenſibly he fell aſleep; but was ſuddenly rouſed by a ſhock of an earthquake, which happened at that inſtant, on the 18th of September 1692. The moment he awoke, he obſerved the ſkeletons move about as they were ſhaken in different directions, and the looſe ſkulls roll from one ſide of the room to the other; and being totally ignorant of the cauſe, he was ſtruck with ſuch a horror, that he threw himſelf down ſtairs, and tumbled into the ſtreet half dead. His friends took all poſſible pains to efface the impreſſion made on his mind by that unlucky event, and acquainted him with the real cauſe of the agitation of the ſkeletons; yet the tranſaction ſtill affected his ſpirits in ſo violent a manner, that it brought on a diſorder, which in a ſhort time ended his days. His general ſubjects were either allegorical or emblematical alluſions to the ſhortneſs and miſery of human life.

PEWIT, Sea-crow, or *Mire-Crow*. See Larus, Ornithology *Index*.

PEWTER, a factitious metal uſed in making domeſtic utenſils, as plates, diſhes, &c.—The baſis of the metal is tin, united to ſmall portions of lead, zinc, biſmuth, and antimony. "We have (ſays Dr Watſon) three ſorts of pewter in common uſe; they are diſtinguiſhed by the name of *Plate*, *Trifle*, and *Ley*. The plate pewter is uſed for plates and diſhes; the trifle, chiefly for pints and quarts; and the ley-metal for wine meaſures, &c. Our very beſt pewter is ſaid to conſiſt of 100 parts tin, and 17 of antimony, though others allow only 10 parts of the latter." Beſides this compoſition, there are other kinds, compounded of tin, antimony, biſmuth, and copper, in ſeveral proportions. * *Chem. Eſſays*, iv. 167.

PEYRERE, Isaac la, a remarkable character for verſatility in religious opinions, was born at Bourdeaux, of proteſtant parents, in 1594. He entered the ſervice of

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(A) In the town of Rumſey there is a houſe which was given by him for the maintenance of a charity-ſchool; the rent of which is ſtill applied to that uſe.

of the Prince of Conde, who was much pleaſed with the ſingularity of his genius. From the peruſal of St Paul's writings he took into his head to aver, that Adam was not the firſt of the human race; and, in order to prove this extravagant opinion, he publiſhed in 1655 a book, which was printed in Holland in 4to and in 12mo, with this title: *Preadamitæ, ſive exercitatio ſuper verſibus 12, 13, 14. cap. 5. Epiſtolæ Pauli ad Romanos.* This work was burnt at Paris, and the author impriſoned at Bruſſels, through the influence of the archbiſhop of Malines's grand vicar. The Prince of Conde having obtained his liberty, he travelled to Rome in 1656, and there gave in to Pope Alexander VII. a ſolemn renunciation both of Calviniſm and Preadamitiſm. His converſion was not thought to be ſincere, at leaſt with regard to this laſt hereſy. His deſire to be the head of a new ſect is evident; and his book diſcovers his ambition; for he there pays many compliments to the Jews, and invites them to attend his lectures. Upon his return to Paris, notwithſtanding the earneſt ſolicitations of his holineſs to remain at Rome, he went again into the Prince of Conde's ſervice in the quality of librarian. Some time after he retired to the ſeminary *des Vertus*, where he died the 30th of January 1676, at the age of 82, after the ſacraments of the church had been adminiſtered to him. Father Simon ſays, that when he was importuned in his laſt moments to retract the opinion which he had formed reſpecting the Preadamites, his anſwer was, *Hi quæcunque ignorant blaſphemant.* His having no fixed ſentiments of religion is ſuppoſed to proceed more from a peculiar turn of mind than a corruption of the heart; for good nature, ſimplicity of manners, and humanity, ſeem to have formed his character. "He was (ſays Niceron) a man of a very equal temper, and moſt agreeable converſation. He was a little too fond, however, of indulging his wit, which ſometimes bordered on raillery; but he took care never to hurt or wound the feelings of his neighbour. His learning was extremely limited. He knew nothing either of Greek or Hebrew; and yet he ventured to give a new interpretation of ſeveral paſſages of the ſacred volume. He piqued himſelf on his knowledge of the Latin; but excepting a few poets which he had read, he was by no means an adept in that language. His ſtyle is very unequal; ſometimes ſwelling and pompous, at other times low and grovelling." Beſides the work already mentioned, he has left behind him, I. A treatiſe as ſingular as it is ſcarce, intitled, *Du rappel de Juifs*, 1643, in 8vo. The recal of the Iſraelites, in the opinion of this writer, will be not only of a ſpiritual nature, but they will be reinſtated in the temporal bleſſings which they enjoyed before their rejection. They will again take poſſeſſion of the holy land, which will reſume its former fertility. God will then raiſe up to them a king more juſt, and more victorious, than any of their former ſovereigns had been. Now, though all this is doubtleſs to be underſtood ſpiritually of Jeſus Chriſt, yet our author is of opinion, that it ought alſo to be underſtood of a temporal prince, who ſhall ariſe for the purpoſe of effecting the temporal deliverance of the Jews; and that this prince ſhall be no other than the king of France, for the following reaſons, which, it is believed, will carry conviction to few minds: 1. Becauſe the two titles of *Moſt Chriſtian*, and of *Eldeſt Son of the Church*, are aſcribed to him by way of excellence. 2. Becauſe it is preſumable, if the kings of France poſſeſs the virtue of curing the evil or ſcrofula, which can only affect the bodies of the Jews; that they will likewiſe have the power of curing their obſtinate incredulity, and the other inveterate diſeaſes of their ſouls. 3. Becauſe the kings of France have for their arms a *fleur de lis*; and becauſe the beauty of the church is in Scripture compared to the beauty of lilies. 4. Becauſe it is probable that France will be the country whither the Jews ſhall firſt be invited to come and embrace the Chriſtian faith, and whither they ſhall retreat from the perſecution of the nations that have dominion over them: for France is a land of freedom, it admits of no ſlavery, and whoever touches it is free. Peyrere, after explaining his Preadamite ſyſtem, propoſes a method of converting the Jews to Chriſtianity; a method, ſays Niceron, which will not be acceptable to many. He propoſes to reduce the whole of religion to a bare faith or belief in Jeſus Chriſt; taking it for granted, without any ſhadow of proof, that "it is as difficult to comprehend the articles of our faith, as to obſerve the ceremonies of Moſes.—From this ſcheme (ſays he) there would reſult a double advantage to the church; the reunion of the Jews, and of all thoſe Chriſtians who are ſeparated from the body of the church." Peyrere, when he wrote this book, was a Calviniſt; but his Calviniſm too nearly reſembled the Deiſm of our age. He confeſſed himſelf, that his reaſon for quitting the Proteſtants was on account of their being the firſt and principal oppoſers of his book concerning the Preadamites. II. A curious and entertaining account of Greenland, printed in 8vo, 1647. When he was aſked, on occaſion of this work, why there were ſo many witches in the north? he replied, "It is becauſe part of the property of theſe pretended conjurers, when condemned to ſuffer death, is declared to belong to their judges." III. An equally intereſting account of Iceland, 1663, 8vo. IV. A letter to Philotimus, 1658, in 8vo, in which he explains the reaſons of his recantation, &c. We find in Moreri the following epitaph of him, written by a poet of his own times.

La Peyrere ici gît, ce bon Iſraelite,
Huguenot, Catholique, enfin Preadamite.
Quatre religions lui plurent à la fois,
Et ſon indifference étoit ſi peu commune,
Qu'après quatre-vingts ans qu'il eut à faire un
choix,
Le bon homme partit, & n'en choiſit pas une.

PEYRONIUS, FRANCIS DE LA, for a long time practiſed ſurgery at Paris with ſuch diſtinguiſhed eclat, that he obtained for himſelf the appointment of firſt ſurgeon to Louis XV. He improved this favourable ſituation with his majeſty, and procured to his profeſſion thoſe honours which had the effect to quicken its progreſs, and thoſe eſtabliſhments which contributed to extend its benefits. The Royal College of Surgery at Paris was founded by his means in 1731, was enlightened by his knowledge, and encouraged by his munificence. At his death, which happened at Verſailles the 24th of April 1747, he bequeathed to the ſociety of ſurgeons in Paris two thirds of his effects, his eſtate of Marigni, which was ſold to the king for 200,000 livres, and his library. This uſeful citizen alſo left to the ſociety of ſurgeons at Montpelier two houſes, ſituated in that town, with 100,000 livres, for the purpoſe of erecting there a chirurgical amphitheatre. He appointed the ſame ſociety univerſal legatee for the third of his effects; and all theſe legacies contain clauſes whoſe ſole object is to promote the public good, the perfection and improvement of ſurgery; for which he always ſolicited the protection of the court. At the time of the famous diſpute between the phyſicians and ſurgeons, he entreated the Chancellor d'Agueſſan to build up a brazen wall between the two bodies. "I will do ſo, replied the miniſter, but on what ſide of the wall ſhall we place the ſick:" Peyronius afterwards behaved with more moderation.—He was a philoſopher without any oſtentation; but his philoſophy was tempered by a long acquaintance with the world and with the court. The acuteneſs and delicacy of his underſtanding, joined to his natural vivacity, rendered his converſation agreeable; and all theſe advantages were crowned with a quality ſtill more valuable, an uncommon degree of ſympathy for thoſe in diſtreſs. He was no ſooner known to be at his eſtate in the country, than his houſe was filled with ſick people, who came to him from the diſtance of 7 or 8 leagues round about. He had once a plan of eſtabliſhing, on this ſpot, an hoſpital, to which he intended to retire, that he might devote the remainder of his life to the ſervice of the poor.

PEYROUSE, or Perouse, John Francis Galoup de la, the celebrated but unfortunate French navigator, was born at Albi in the year 1741. His father intended to train him up to a maritime life, for which purpoſe he ſent him, when very young, to the marine ſchool, where he became enthuſiaſtically attached to his profeſſion, and ambitious to emulate the fame of the moſt celebrated navigators.

He was appointed midſhipman on the 19th of November 1756, behaving with great bravery in that ſtation; and was ſeverely wounded in the engagement between Hawke and Conflans, on the 20th of November 1759. The Formidable, in which he ſerved, was taken, after a vigorous reſiſtance; and it is probable that Peyrouſe reaped ſome advantage from his acquaintance with Britiſh officers.

He was promoted, on the 1ſt of October 1764, to the rank of lieutenant; and as he abhorred a life of eaſe and idleneſs, he contrived to be employed in ſix different ſhips of war during the peace that ſubſiſted between Great Britain and France. In 1767 he was promoted to the rank of maſter and commander. In 1779 he commanded the Amazone, belonging to the ſquadron of Vice-admiral Count d'Eſtaing; and when that officer engaged Admiral Byron, the poſt of La Peyrouſe was to carry the orders of the admiral to the whole of the line. He afterwards took the ſloop Ariel, and contributed to the capture of the Experiment.

In the year 1782, La Peyrouſe was ſent with the Sceptre of 74 guns, and two frigates of 36 guns each, with ſome troops and field-pieces on board, to deſtroy the Engliſh ſettlements in Hudſon's Bay, which was eaſily accompliſhed, as nothing was found on ſhore to oppoſe the ſmalleſt force. Having deſtroyed the ſettlements, he learned that ſome of the Engliſh had fled at his approach into the woods. He generouſly left them proviſions and arms to defend themſelves againſt the ſavages.

In the year 1785, he was appointed to the command of ſome ſhips employed in a voyage round the world, which unfortunately proved his laſt. Of this voyage, as far as it was acompliſhed, full accounts have been already publiſhed, from which it is manifeſt that Peyrouſe was admirably qualified to diſcharge ſuch a truſt. He was an experienced and ſkilful ſeaman; a man of mathematical and phyſical ſcience, uncorrupted by that falſe philoſophy which diſgraced many of his attendants, and capable of the utmoſt perſeverance in every commendable purſuit. To theſe excellent qualities he added caution and courage, with a diſpoſition truly benevolent towards the ſavages whom he viſited. Moſt of the calamities attendant on the voyage, with the exception of the laſt, were occaſioned by the diſobedience of his officers, or their neglecting to follow his advice.

The laſt diſpatches of this great and truly excellent man were dated from Botany Bay, February 7. 1788; and ſince that period, no account of him has been received which is entitled to the ſmalleſt credit.

PEZAY, N. Masson, marquis of, born at Paris, very early applied himſelf to the ſtudy of letters, and afterwards went into the army. He was made a captain of dragoons; and had the honour of giving ſome leſſons on tactics to the ill-fated Louis XVI. Being appointed inſpector general of ſome coaſting veſſels, he repaired to the maritime towns, and executed his commiſſion with more care and attention than was to have been expected from a votary of the muſes. But as, at the ſame time, he ſhowed too much haughtineſs, a complaint was brought againſt him to the court, and he was baniſhed to his country ſeat, where he died ſoon after, in the beginning of 1778. He was the intimate friend and companion of Dorat. He had ſtudied, and ſucceſsfully imitated, his manner of writing; but his poems have more delicacy, and are leſs disfigured with trifling converſations of gallantry. He has left behind him, 1. A tranſlation of Catullus, which is not much eſteemed. 2. Les Soirées Helvetiennes, Alſaciennes, et Franc-Comtoiſes, in 8vo, 1770; a work very agreeably diverſified, full of charming landſcapes, but written with too little accuracy. 3. Les Soirées Provençales, in manuſcript, which are ſaid to be nowiſe inferior in merit to the foregoing ones. 4. La Roſiere de Salency; a paſtoral in three acts, and which has been performed with ſucceſs on the Italian theatres. 5. Les campagnes de Maillebois, in 3 vols 4to, and a volume of maps.

PEZENAS, a place in France about 24 miles from Montpelier. The ſoil about it is ſandy. The rock is limeſtone. The fields are open, and produce corn, wine, and oil. There are to be ſeen at this place the extenſive ruins of a caſtle, which formerly belonged to the Montmorency family. This ſtrong fortreſs was hewn out of the rock on which it ſtands, and appears to have been complicated and full of art. The walls are lofty, and above 8 feet in thickneſs. The rock, which is perpendicular, is a maſs of ſhells, ſuch as turbinites, oyſters, cockles, with a calcareous cement. From hence the circumjacent plain, decked with luxuriant verdure, and ſhut in by rugged mountains, affords a moſt delightful proſpect. E. Long. 3. 35. N. Lat. 43. 18.

PEZIZA, Cup-mushroom, a genus of plants of the natural order of fungi, belonging to the cryptogamia claſs. See Botany *Index*.

PHACA, a genus of plants belonging to the diadelphia claſs; and in the natural method ranking under the 32d order, *Papilionaceæ*. See BOTANY *Index*.

PHÆA, in *Antiquity*, a famous ſow which infeſted the neighbourhood of Cromyon. Theſeus deſtroyed it as he was travelling from Trœzene to Athens to make himſelf known to his father. Some imagine that the boar of Calydon ſprung from this ſow. According to ſome authors, Phæa was a woman who proſtituted herſelf to ſtrangers, whom ſhe murdered, and afterwards plundered.

PHÆACIA, one of the ancient names of the iſland Corcyra. *Phæaces* the people, who were noted for their indolence and luxury.

PHÆDON, a diſciple of Socrates, who had been ſeized by pirates in his youth; and the philoſopher, who ſeemed to diſcover ſomething uncommon in his countenance, bought his liberty for a ſum of money. Phædon, after Socrates's death, returned to Elis his native country, where he founded a ſect of philoſophers who compoſed what was called the *Eliac ſchool*. The name of Phædon is affixed to one of Plato's dialogues.

PHÆDRA, in fabulous hiſtory, was a daughter of Minos and Paſiphae; ſhe married Theſeus, by whom ſhe was the mother of Acamas and Demophoon. They had already lived for ſome time in conjugal felicity, when Venus, who hated all the deſcendants of Apollo, becauſe he had diſcovered her amours with Mars, inſpired Phædra with the ſtrongeſt paſſion for Hippolytus the ſon of Theſeus, by the amazon Hippolyte. This paſſion ſhe long attempted to ſtifle, but in vain; and therefore, in the abſence of Theſeus, ſhe addreſſed Hippolytus with all the impatience of deſponding love. He rejected her with horror and diſdain. She, however, incenſed by the reception ſhe had met, reſolved to puniſh his coldneſs and refuſal; and at the return of Theſeus ſhe accuſed Hippolytus of attempts upon her virtue. He liſtened to her accuſation; and without hearing Hippolytus's defence, he baniſhed him from his kingdom, and implored Neptune, who had promiſed to grant three of his requeſts, to puniſh him in an exemplary manner. As Hippolytus fled from Athens, his horſes were ſuddenly terrified by a ſea monſter, which Neptune had ſent on the ſhore; and he was thus dragged through precipices and over rocks, trampled under the feet of his horſes, and cruſhed under the wheels of his chariot. When his tragical end was known at Athens, Phædra confeſſed her crime, and hung herſelf in deſpair, unable to ſurvive one whoſe death her extreme guilt had occaſioned. The death of Hippolytus, and the infamous paſſion of Phædra, is the ſubject of one of the tragedies of Euripides and of Seneca. She was buried at Trœzene, where her tomb was ſtill to be ſeen in the time of the geographer Pauſanias, near the temple of Venus, which ſhe had built to render the goddeſs favourable to her inceſtuous paſſion. Near her tomb was a myrtle, whoſe leaves were full of ſmall holes, which, it was reported, Phædra had done with a hair pin, when the vehemence of her paſſion had rendered her melancholy and almoſt deſperate. She was repreſented in a painting in Apollo's temple at Delphi, as ſuſpended in the air, while her ſiſter Ariadne ſtood near to her, and fixed her eyes upon her.

PHÆDRUS, an ancient Latin writer, who compoſed five books of fables, in iambic verſe. He was a Thracian; and was born, as there is reaſon to conclude, ſome years before Julius Cæſar made himſelf maſter of the Roman empire. How he came into the ſervice of Auguſtus is not known; but his being called *Auguſtus's freedman* in the title of the book, ſhows that he had been that emperor's ſlave. The fables of Phædrus are valued for their wit and good ſenſe, expreſſed in very pure and elegant language; and it is remarkable that they remained buried in libraries altogether unknown to the public, until they were diſcovered and publiſhed by Peter Pithou, or Pithœus, a learned French gentleman, toward the cloſe of the 16th century.

PHÆNOMENON, in philoſophy, denotes any remarkable appearance, whether in the heavens or earth, and whether diſcovered by obſervation or experiment.

PHAETON, in fabulous hiſtory, was the ſon of the Sun, or Phœbus and Clymene, one of the Oceanides. He was ſon of Cephalus and Aurora, according to Heſiod and Pauſanias; or of Tithonus and Aurora, according to Apollodorus. He is, however, more generally acknowledged to be the ſon of Phœbus and Clymene. He was naturally of a lively diſpoſition, and a handſome figure. Venus became enamoured of him, and entruſted him with the care of one of her temples. This diſtinguiſhing favour of the goddeſs rendered him vain and aſpiring; and when Epaphus, the ſon of Io, had told him, to check his pride, that he was not the ſon of Phœbus, Phaeton reſolved to know his true origin, and at the inſtigation of his mother he viſited the palace of the ſun. He begged Phœbus, that if he really were his father, he would give him inconteſtable proofs of his paternal tenderneſs, and convince the world of his legitimacy. Phœbus received him with great tenderneſs, and ſwore by Styx to grant whatever he requeſted as a proof of his acknowledging him for his ſon. The youth boldly aſked the direction of the chariot of the ſun for one day. His father, grieved and ſurpriſed at this demand, uſed all his arguments to diſſuade him from the raſh attempt; but all was in vain: and being by his oath reduced to ſubmit to his obſtinacy, entruſted him with the reins, after he had directed him how to uſe them. The young adventurer was however ſoon ſenſible of his madneſs. He was unable to guide the fiery ſteeds; and looſing the reins, Jupiter, to prevent his conſuming the heavens and earth, ſtruck him with a thunderbolt, and hurled him from his ſeat into the river Eridanus or Po. His ſiſters Phaethuſa, Lambetia, and Phœbe, lamenting his loſs upon its banks, were changed by the gods into black poplar trees; and Cycnus king of Liguria, alſo grieving at his fate, was transformed into a ſwan.

The poets ſay, that while Phaeton was driving the chariot of his father, the blood of the Ethiopians was dried up; and their ſkin became black; a colour which is ſtill preſerved among the greateſt part of the inhabitants of the torrid zone. The territories of Libya were alſo, they tell us, parched up, on account of their too great vicinity to the ſun; and ever ſince, Africa, unable to recover her original verdure and fruitfulneſs, has exhibited a ſandy country and uncultivated waſte. According to thoſe who explain this poetical fable, Phaeton was a Ligurian prince, who ſtudied aſtronomy, and in whoſe age the neighbourhood of the Po was viſited with uncommon heats.

PHAETON, a genus of birds belonging to the order of anſeres. See ORNITHOLOGY *Index*.

PHAGEDÆNA, in *Medicine*, denotes a corroding ulcer.

PHAGEDENIC MEDICINES, thoſe uſed to eat off proud or fungous fleſh; ſuch as are all the cauſtics.

PHAGEDENIC Water, in *Chemiſtry*, denotes a water made from quicklime and ſublimate; and is very efficacious in the cure of phagedenic ulcers. To prepare this water, put two pounds of freſh quicklime in a large earthen pan, and pour upon it about ten pounds of rain-water; let them ſtand together for two days, ſtirring them frequently: at laſt leave the lime to ſettle well, then pour off the water by inclination, filtrate it, and put it up in a glaſs bottle, adding to it an ounce of corroſive ſublimate in powder; which from white becomes yellow, and ſinks to the bottom of the veſſel. The water being ſettled, is fit for uſe in the cleanſing of wounds and ulcers, and to eat off ſuperfluous fleſh, and eſpecially in gangrenes; in which caſe may be added to it a third or fourth part of ſpirit of wine.

PHALÆNA, the MOTH, a genus of inſects belonging to the order of lepidoptera. See ENTOMOLOGY *Index*.

PHALANGIUM, a genus of inſects belonging to the order of aptera. See ENTOMOLOGY *Index*.

PHALANGOSIS, in *Surgery*, is a tumor and relaxation of the eyelids, often ſo great as to deform the eye, and conſiderably to impede viſion. Sometimes the eyelid when in this ſtate ſubſides or ſinks down, occaſioned perhaps either by a palſy of the muſcle which ſuſtains and elevates the eyelid, or elſe from a relaxation of the cutis above, from various cauſes. But in the paralytic or relaxed caſe, the uſe of cordial and nervous medicines muſt be propoſed internally; and outwardly, balſam of Peru and Hungary water are to be employed. If all theſe fail, the remaining method of cure is to extirpate a ſufficient quantity of the relaxed cutis.

PHALANX, in Grecian antiquity, a ſquare battalion of ſoldiers, with their ſhields joined and pikes croſſing each other; ſo that it was next to impoſſible to break it.

The Macedonian phalanx is ſuppoſed by ſome to have had the advantage in valour and ſtrength, over the Roman legion. Its number was 8000 men. But the word *phalanx* is uſed for a party of 28, and ſeveral other numbers; and even ſometimes for the whole body of foot. See LEGION.

PHALANX is applied, by anatomiſts, to the three rows of ſmall bones which form the fingers. See ANATOMY *Index*.

PHALARIS, a remarkable tyrant, born at Crete, where his ambitious deſigns occaſioned his baniſhment: he took refuge in Agrigentum, a free city of Sicily, and there obtained the ſupreme power by ſtratagem. The circumſtance which has chiefly contributed to preſerve his name in hiſtory is his cruelty; in one act of which he gave, however, an example of ſtrict juſtice. It is thus related: Perillus, a braſs-founder at Athens, knowing the cruel diſpoſition of Phalaris, contrived a new ſpecies of puniſhment for him to inflict on his ſubjects. He caſt a brazen bull, bigger than the life, with an opening in the ſide to admit the victims; who being ſhut up in the body, a fire was kindled under it to roaſt them to death; and the throat was ſo contrived, that their dying groans reſembled the roaring of a bull. The artiſt brought it to the tyrant, expecting a great reward. Phalaris admired the invention and workmanſhip, but ordered the inventor to be put into it to make the firſt trial. In alluſion to which, Ovid ſays,

> ———*Neque enim lex æquior ulla,*
> *Quam necis artifices arte perire ſua.*

The end of this deteſtable tyrant is differently related; but it is very generally believed, with Cicero, that he fell by the hands of the Agrigentines; and, as ſome ſuppoſe, at the inſtigation of Pythagoras. Ovid tells us, that his tongue was cut out; and that he was then put into the bull to periſh by the ſame ſlow fire by which means he had murdered ſo many before. Others ſay that he was ſtoned to death; and all agree that his end was violent. He reigned, Euſebius ſays, 28 years; others ſay 16. After all, there is great uncertainty both as to his life, death, and hiſtory. Many of the circumſtances related of him, as they are collected by Mr Boyle, depend upon the authenticity of thoſe epiſtles which go under the name of the tyrant; and which have been juſtly queſtioned, and with great probability rejected, as the ſpurious production of ſome modern ſophiſt. See BENTLEY, p. 177. col. 2.

PHALARIS, or *Canary-graſs*, a genus of plants belonging to the triandria claſs. See BOTANY *Index*.

PHALERÆ, among the ancient Romans, were military rewards beſtowed for ſome ſignal act of bravery. Authors do not agree whether the Phaleræ were a ſuit of rich trappings for a horſe, or golden chains ſomething like the torques, but ſo formed as to hang down to the breaſt and diſplay a greater profuſion of ornament. The laſt opinion appears to have the greater prevalence, but perhaps both are true.

PHALEREUS (Nepos), a village and port of Athens; this laſt neither large nor commodious, for which reaſon Themiſtocles put the Athenians on building the Piræus; both joined to Athens by long walls. The Phalereus lay nearer the city (Pauſanias). Demetrius Phalereus, the celebrated ſcholar of Theophraſtus, was of this place; to whom the Athenians erected above 300 ſtatues; which were afterwards deſtroyed by his enemies, on his flight to Ptolemy king of Egypt (Strabo). Here Demoſthenes was wont to declaim, to accuſtom his voice to ſurmount the noiſe and roaring of the ſea; a juſt and lively emblem of popular aſſemblies.

PHALEUCIAN VERSE, in ancient poetry, a kind of verſe conſiſting of five feet; the firſt of which is a ſpondee, the ſecond a dactyl, and the three laſt trochees.

PHALLUS, the MOREL, a genus of plants of the order of fungi, and belonging to the cryptogamia claſs. See BOTANY *Index*.

PHALLUS, among the Egyptians, was the emblem of fecundity. It was very fervently worſhipped by women, eſpecially by thoſe who were barren. This cuſtom was introduced among the Greeks, and feſtivals in honour of it were called *phaluca*. See MYSTERIES, N° 38, &c. Among the Hindoos a ſimilar emblem called *lingam* is uſed, and for ſimilar purpoſes. See HINDOOS, N° 4.

PHALTI, or PHALTIEL, ſon of Laiſh. He married Michal, after Saul had taken her from David; but David afterwards took her away from Phalti (1 Sam. xxv. 44. 2 Sam. iii. 15.). Some interpreters are of opinion Phalti did not meddle with Michal all the time ſhe continued in his houſe, for fear that both of them ſhould incur the penalty of death, to be inflicted on adulterers (Levit. xx. 10.), becauſe Michal had not been legally divorced; but theſe reaſons are frivolous. Saul looked upon David as a rebel to his king, and an outlaw, whoſe goods and wives belonged to him, and which he could abſolutely diſpoſe of. He would not have given Michal to Phalti, nor would he have received her, if he had not thought he might uſe her as his wife. If Michal had no children by Phalti, by whom then were thoſe children that the ſcripture ſays ſhe had, ſince it is known ſhe had none by David? See 2 Sam. xxi. 8. and vi. 23.

PHANATIC, or Fanatic, a viſionary; one who fancies he ſees ſpectres, ſpirits, apparitions, or other imaginary objects, even when awake; and takes them to be real. See Phantasy and Fanatic.

Such are phrenetics, necromancers, hypochondriac perſons, lycanthropi, &c. See Phrenetic, Hypochondriac, Lycanthropi.

Hence the word is alſo applied to enthuſiaſts, pretenders to revelation, new lights, prophecies, &c. See Enthusiast, and *Second Sight*.

PHANTASIA was the daughter of Nicarchus of Memphis in Egypt. It has been ſuppoſed that ſhe wrote a poem on the Trojan war, and another on the return of Ulyſſes to Ithaca, from which compoſitions Homer copied the greateſt part of his Iliad and Odyſſey, when he viſited Memphis, where they were depoſited.

PHANTASM, a term ſometimes uſed in a ſynonymous ſenſe with idea, or notion retained in the mind, of an external object.

PHANTASMAGORIA, an optical deception. See Science, *Amuſements of.*

PHANTASY, or Fancy, the *Imagination;* one of the powers of the mind, by which the ſpecies of objects received by the external organs of ſenſe are retained, recalled, further examined, and either compounded, or divided: See Imagination; and Metaphysics, Part I. Chap. ii. Or it is that internal ſenſe whereby the ideas of abſent things are formed, and repreſented to the mind as if they were preſent. In melancholics and madmen this faculty is very ſtrong, repreſenting many extravagant and monſtrous things, and framing its images as lively as thoſe of ſenſation: whence the viſions and deceptions thoſe perſons are liable to.

PHANUEL, of the tribe of Aſher, the father of a holy widow and propheteſs called Anna, who was in the temple when our Saviour was preſented there by his parents (Luke ii. 36, 37, 38.).

PHAON, a young man of Mytilene, in the iſland of Leſbos, received from Venus, as fable reports, an alabaſter vaſe filled with an eſſence which had the virtue of conferring beauty. He had no ſooner anointed his body with it than he became the moſt beautiful of men. The ladies of Mytilene fell deſperately in love with him; and the celebrated Sappho threw herſelf down a precipice becauſe he would not encourage her paſſion. He is ſaid to have been killed by a huſband who ſurpriſed him with his wife. We have in Ovid a letter from Sappho to Phaon, which Mr Pope has tranſlated into Engliſh verſe.

PHARA, in *Ancient Geography*, a village between Egypt and Arabia Petræa; or, according to Ptolemy, at a promontory ſituated between the Sinus Heroopolites and Elaniticus of the Red ſea; where Iſmael is ſaid to have dwelt. In Hebrew it is *Paran*, and in moſt interpreters; *Pharan*, Septuagint and Vulgate. *Pharanitæ*, the people (Ptolemy). *Paran* or *Pharan*, the name of the wilderneſs in its neighbourhood, adjoining to Kadeſh.

PHARÆ, in *Ancient Geography*, a town of Achaia in Peloponneſus, on the river Pierus, 70 ſtadia from the ſea, and to the ſouth of Patræ 150 ſtadia. Another, of Crete (Pliny); a colony from the *Pharæ* of Meſſenia (Stephanus). A third *Pharæ*, or *Pheræ* (Strabo, Ptolemy); *Phara*, *-æ*, (Polybius); a town of Meſſenia, on the river Nedo (Strabo); on the north ſide of the Sinus Meſſenius, and to the north-weſt of Abea. Anciently read *Pharis* in Homer (Pauſanias, Statius), though now read *Phare*. *Pharitæ* is the name of the people.

PHARAMOND is the name which is given by the generality of hiſtorians to the firſt king of France. He is ſaid to have reigned at Treves, and over a part of France, about the year 420; and to have been ſucceeded by his ſon Clodion: but the account which is given of theſe two princes is very uncertain. It is probable Pharamond was properly no more than a general of an army, the head of a military ſociety of Franks, who were maſters of their perſons and their fortunes. Gregory of Tours ſeems to have been of this opinion. "It is not generally known (ſays he) who was the firſt king of the French. Sulpitius Severus, who mentions ſeveral things reſpecting that nation, takes no notice of its firſt monarch; he only ſays that it had generals." Be that as it may, the inſtitution of the famous Salique law (ſo named from the Salians, the moſt illuſtrious of the Franks) is generally attributed to Pharamond. "This law fixed the puniſhment of crimes, and various points of police. There is no juſt ground for believing that it expreſsly ſettled the right of ſucceſſion to the crown: it only ſays, that, with relation to the Salic land, women have no ſhare of heritage, without reſtricting it to the royal family in particular; for all thoſe were generally called *Salic lands* which were held by right of conqueſt; and it is eaſy to conceive that a nation of ſoldiers, whoſe general was their king, would not ſubmit to be governed by a woman. A long cuſtom, ſupported by the principles of the nation, came in time to be the eſtabliſhed law of the kingdom." (See *M. Abbé Millot*, *Elem. de l'Hiſtoire de France*, tom. i.).

PHARAOH, a common name of the kings of Egypt. Joſephus ſays, that all the kings of Egypt, from Minæus the founder of Memphis, who lived ſeveral ages before Abraham, have always had the name of Pharaoh, down to the times of Solomon, for more than 3300 years.' He adds, that in the Egyptian language the word *Pharaoh* ſignifies a *king;* and that thoſe princes did not aſſume this name but when they aſcended the throne, at which time they quitted alſo their former name. From hence it comes to paſs, ſays Joſephus, that Herodotus names none of the kings of Egypt after Minæus the builder of Memphis, though he had 330 kings for his ſucceſſors, becauſe they had all the name of Pharaoh; but becauſe this name did not paſs to women alſo, he names an Egyptian queen Nicaule who

Pharaoh.

ſucceeded them. Laſtly, I find, adds Joſephus, from the ancient records of our nation, that from the age of Solomon no king of Egypt had any longer the name of Pharaoh.

But Joſephus is not very accurate in this paſſage. True it is, Herodotus ſays, that Mines, or Mineus, was the firſt king of Egypt, and founder of Memphis; that there were 330 kings after him in Egypt; that after them there was a queen called Nicotris, and not Nicaule, as Joſephus writes it; but it is not true that their kings had no other name but Pharaoh. Herodotus ſays expreſsly, that in the books of the Egyptian prieſts were read the names and the catalogue of 330 kings; that in this number of 330 there were 18 Ethiopians, and a woman that was a foreigner called Nicotris, and that all the others were Egyptians. Theſe princes therefore had every one his proper name mentioned in the catalogue of the Egyptian kings. So likewiſe we ſee in the fragments of Manetho, that every king of Egypt had a name peculiar to him; and we find the name Pharaoh only in Scripture.

What Joſephus adds concerning Queen Nicaule, or Nicotris, whom he pretends to be the ſame as the queen of Sheba, of whom mention is made in Scripture (1 Kings x. 1. 2, &c.), is entirely fabulous; and as to what he ſays, that ſince the time of Solomon the kings of Egypt have no longer had the name of Pharaoh, is manifeſtly falſe, ſince we ſtill find this name in the ſecond book of Kings, under Hezekiah (2 Kings xviii. 21.); under Joſiah (xxiii. 29, 30. 33, &c.), where this name is joined to Necho, which was the proper name of this prince; under Jehoiakim (xxiii. 35.); and in the prophets Iſaiah, Jeremiah, and Ezekiel, who are much later than Solomon. It is very probable that the Egyptians gave the name of Pharaoh to their kings as long as the Egyptian language was in common uſe, and as long as their kings were of their own nation: but after the conqueſt of Egypt by Alexander the Great, and that the Grecians introduced their language with their government, the name of Pharaoh was known no longer among them. The firſt prince known to us by the name of Pharaoh was he in whoſe time Abraham went down to Egypt, when Sarah, who paſſed only for Abraham's ſiſter, was by the command of Pharaoh brought to his palace in order to become his wife. See ABRAHAM. But the Lord ſmote Pharaoh and his family with great infirmities, and gave him to know that ſhe was Abraham's wife; whereupon Pharaoh ſent for Abraham, reſtored him his wife, and at the ſame time gave orders that he ſhould be conducted out of Egypt, with every thing that belonged to him. See SARAH.

The ſecond Pharaoh ſpoken of in the Scripture is he who reigned when Joſeph arrived there. This prince or his ſucceſſor had the myſterious dream of the fat and lean kine, and the ſeven full and barren ears of corn, which Joſeph explained ſo much to his ſatisfaction, that he made him governor of his houſe and of all Egypt, reſerving only to himſelf the name of a king. This is the ſame Pharaoh who ſent for and entertained the patriarch Jacob and his family in Egypt, and gave them the land of Goſhen for their habitation. See JOSEPH and JACOB.

The third Pharaoh known in holy writ is he who perſecuted the Iſraelites. Moſes tells us that he was a new king, and had no knowledge of Joſeph (Exod. i. 8.). This prince, obſerving that the Iſraelites had become very numerous and powerful, reſolved to depreſs them by hardſhip and labour; and ſet cruel and pitileſs taſkmaſters over them. But the more he oppreſſed them, the faſter they multiplied; inſomuch that he gave orders to the Egyptian midwives, who aſſiſted the Hebrew women in their labour, to put all the male children to death, and to ſave alive the females only. But this command was not ſtrictly executed. The midwives feared the Lord, and preſerved alive not only the female children, but the males alſo.

Pharaoh.

Pharaoh, ſeeing this project did not ſucceed to his wiſhes, publiſhed a decree (Exod. i. 22.) that all the male children born of Hebrew women ſhould be thrown into the Nile, and that only the females ſhould be ſpared. This order was rigorouſly executed; yet by the providence of God Moſes was preſerved, and even brought up in Pharaoh's own court, by his own daughter, who by chance had found the child, as he was expoſed upon the Nile.

Moſes being grown up, and having killed an Egyptian who had abuſed an Hebrew, was obliged to fly from Egypt to avoid that death that Pharaoh had threatened him with.

Several years after, being about 80 years old, he returned again by an order from God, and performed mighty miracles before Pharaoh. See MOSES. There is a good deal of probability that this Pharaoh before whom Moſes appeared, and in whoſe ſight he ſmote Egypt with ſo many plagues, was a different perſon from him who would have laid hands on him after he had ſlain the Egyptian. This ſame Pharaoh having at laſt been compelled to ſend away the Hebrews, and to ſuffer them to go out of Egypt, ſoon repented of the leave he had given, and purſued them at the head of his army with his chariots. But he was drowned in the Red ſea, wherein he had raſhly entered in the eagerneſs of his purſuit. Some hiſtorians pretend to give us the name of this Pharaoh; ſome, as Appion, call him Amoſis or Amaſis; Euſebius calls him Chenchris; Uſher calls him Amenophis; but we may aſſure ourſelves that there can be nothing certain in all this.

The fifth Pharaoh known to us is he who gave protection to Hadad ſon of the king of Edom, who gave him to wife the ſiſter of his own queen, enriched him with lands, and brought up his ſon Genubah in his own court. Hadad returned to Idumea after the death of David.

The ſixth Pharaoh is he who gave his daughter in marriage to Solomon king of the Hebrews (1 Kings iii. 1.); and having taken Gezer, he ſet it on fire, drove the Canaanites out of it, and gave it for a preſent to Solomon, in lieu of a dowry for his daughter, whom he had married to this prince (1 Kings ix. 16.).

The ſeventh is Shiſhak, who entertained Jeroboam in his dominions, a rebellious ſubject of Solomon, and offered him a refuge in oppoſition to the king his maſter. The ſame Shiſhak declared war againſt Rehoboam the ſon and ſucceſſor of Solomon, beſieged and took Jeruſalem, carried away all the king's treaſures, and thoſe of the houſe of God, and particularly the golden bucklers that Solomon had made. See SHISHAK.

The eighth is that Pharaoh with whom Hezekiah made a league againſt Sennacherib king of Aſſyria, in the year of the world 3290. See SENNACHERIB. This Pharaoh is probably the ſame whom Herodotus names

Sethon, prieſt of Vulcan, who came to meet Sennacherib before Peluſium, and to whoſe aſſiſtance Vulcan ſent an army of rats, which gnawed the bow-ſtrings and the thongs of the bucklers of Sennacherib's ſoldiers.

The ninth is Pharaoh-Necho, or Nechos, ſon of Pſammiticus, who made war with Joſiah, and ſubdued him. Herodotus alſo mentions this prince. See NECHO, and EGYPT, Nº 11.

The tenth is Pharaoh Hophrah, who entered into an alliance with Zedekiah king of Judah, and attempted to come to his aſſiſtance againſt Nebuchadnezzar king of Chaldea. It was againſt this Pharaoh that Ezekiel pronounced ſeveral of his prophecies (See Ezek. xxix. xxx. xxxi. xxxii.). He is called Apries in Herodotus, lib. ii. c. 161. He is alſo mentioned in Habakkuk ii. 15, 16. See alſo Iſaiah xix. xx. and Jeremiah xlvi. 16, &c. See APRIES, and EGYPT, Nº 13, &c.

PHARAON is the name of a game of chance, the principal rules of which are: the banker holds a pack conſiſting of 52 cards; he draws all the cards one after the other, and lays them down alternately at his right and left hand; then the ponte may at his pleaſure ſet one or more ſtakes upon one or more cards, either before the banker has begun to draw the cards, or after he has drawn any number of couples. The banker wins the ſtake of the ponte when the card of the ponte comes out in an odd place on his right hand, but loſes as much to the ponte when it comes out in an even place on his left hand. The banker wins half the ponte's ſtake when it happens to be twice in one couple. When the card of the ponte being but once in the ſtock happens to be the laſt, the ponte neither wins nor loſes; and the card of the ponte being but twice in the ſtock, and the laſt couple containing his card twice, he then loſes his whole ſtake. De Moivre has ſhown how to find the gain of the banker in any circumſtance of cards remaining in the ſtock, and of the number of times that the ponte's cards is contained in it. Of this problem he enumerates four caſes, viz. when the ponte's card is once, twice, three, or four times in the ſtock. In the firſt caſe, the gain of the banker is $\frac{1}{n}$, n being the number of cards in the ſtock. In the ſecond caſe, his gain is $\frac{\overline{n-2}\times y}{n\times\overline{n-1}}+\frac{2}{n\times\overline{n-1}}$, or $\frac{\frac{1}{2}n+1}{n\times\overline{n-1}}$, ſuppoſing $y=\frac{1}{2}$. In the third caſe, his gain is $\frac{3y}{2\times\overline{n-1}}$, or $\frac{3}{4\times\overline{n-1}}$, ſuppoſing $y=\frac{1}{2}$. In the fourth caſe, the gain of the banker, or the loſs of the ponte, is $\frac{2n-5}{\overline{n-1}\times\overline{n-3}}y$, or $\frac{2n-5}{2\times\overline{n-1}\times\overline{n-3}}$, ſuppoſing $y=\frac{1}{2}$. De Moivre has calculated a table, exhibiting this gain or loſs for any particular circumſtance of the play; and he obſerves, that at this play the leaſt diſadvantage of the ponte, under the ſame circumſtances of cards remaining in the ſtock, is when the card of the ponte is but twice in it, the next greater when three times, the next when once, and the greateſt when four times. He has alſo demonſtrated, that the whole gain per cent. of the banker, upon all the money that is adventured at this game, is 2l. 19s. 10d. See De Moivre's Doctrine of Chances, p. 77, &c. p. 105, &c.

PHAREZ, ſon of Judah and Tamar (Gen. xxxviii. 27, 28, &c.). Tamar being juſt ready to lie in, found herſelf with child of twins. One of them appeared firſt, and putting his arm out, he immediately drew it back again. The midwife tied a ſcarlet thread upon his arm, to diſtinguiſh him for the firſt-born: but having withdrawn his hand, his brother got before him into the world: whereupon he was called by his mother *Pharez*, i. e. *one breaking forth*; as the other with the thread on his hand was called *Zarah*. The ſons of Pharez were Hezron and Hamul (Numb. xxvi. 20, 21.). F. Calmet, upon this article, explains the text as if Pharez, and not Zarah, had put out his hand, and drew it in again.

PHARISEES, a famous ſect of the Jews, who diſtinguiſhed themſelves by their zeal for the traditions of the elders, which they derived from the ſame fountain with the written word itſelf; pretending that both were delivered to Moſes from Mount Sinai, and were therefore both of equal authority. From their rigorous obſervance of theſe traditions, they looked upon themſelves as more holy than other men; and therefore ſeparated themſelves from thoſe whom they thought ſinners or profane, ſo as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which ſignifies "to ſeparate", they had the name of *Phariſees* or *ſeparatiſts*.

This ſect was one of the moſt ancient and conſiderable among the Jews; but its original is not very well known (A); however, it was in great repute in the time of our Saviour; and muſt have had its original at the ſame time with the traditions, and they grew up together

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(A) The Jeſuit Serrarius places their firſt riſe about the time of Eſdras; becauſe it was then that the Jews firſt began to have interpreters of their traditions. Maldonat, on the other hand, will not have this ſect to have ariſen among the Jews till a little before the time of Chriſt. Others, perhaps, with more probability, refer the origin of the Phariſees to the time of the Maccabees.

Dr Lightfoot thinks, that Phariſaiſm roſe up gradually, from a period which he does not aſſign, to the maturity of a ſect. It is certain, from the account given by Joſephus, that in the time of John Hyrcanus, the high prieſt and prince of the Aſmonean line, about 108 years before Chriſt, the ſect was not only formed, but made a conſiderable figure; and that it had advanced to a high degree of popularity and power about 80 years before Chriſt. Joſ. Ant. lib. xiii. cap. 10. § 5, 6. cap. 15. § 5. and cap. 16. § 1. According to Baſnage, Hiſt. of the Jews, book ii. cap. 9. § 2. one Ariſtobulus, an Alexandrian Jew, and a Peripatetic philoſopher, who flouriſhed about 125 years before Chriſt, and wrote ſome allegorical commentaries on the ſcripture, was the author of thoſe traditions by an adherence to which the Phariſees were principally diſtinguiſhed from other ſects.

gether, till at length they had gained ground ſo far, that the traditional law ſwallowed up the written, and thoſe who were the propagators of it the whole bulk of the Jewiſh nation.

The extraordinary pretences of the Phariſees to righteouſneſs drew after them the common people, who held them in the higheſt eſteem and veneration. Our Saviour frequently, however, charges them with hypocriſy, and making the law of God of no effect through their traditions (Matth. ix. 2. xv. 1—6. xxiii. 13—33. and Luke xi. 39—52.). Several of theſe traditions are particularly mentioned in the goſpel; but they had a vaſt number more, which may be ſeen in the Talmud, the whole ſubject whereof is to dictate and explain thoſe traditions which this ſect impoſed to be believed and obſerved.

The Phariſees, contrary to the opinion of the Sadducees, held a reſurrection from the dead, and the exiſtence of angels and ſpirits (Acts xxiii. 8.). But according to Joſephus, this reſurrection of theirs was no more than a Pythagorean reſurrection, that is, of the ſoul only, by its tranſmigration into another body, and being born anew with it. From this reſurrection they excluded all that were notoriouſly wicked, being of opinion that the ſouls of ſuch perſons were tranſmitted into a ſtate of everlaſting woe. As to leſſer crimes, they held they were puniſhed in the bodies which the ſouls of thoſe who committed them were next ſent into.

Joſephus, however, either miſtook the faith of his countrymen, or, which is more probable, wilfully miſrepreſented it, to render their opinions more reſpected by the Roman philoſophers, whom he appears to have on every occaſion been deſirous to pleaſe. The Phariſees had many pagan notions reſpecting the ſoul; but Biſhop Bull, in his *Harmonia Apoſtolica*, has clearly proved, that they held a reſurrection of the body, and that they ſuppoſed a certain bone to remain uncorrupted, to furniſh the matter of which the reſurrection body was to be formed. They did not, however, believe that all mankind were to be raiſed from the dead. A reſurrection was the privilege of the children of Abraham alone, who were all to riſe on Mount Zion; their incorruptible bones, wherever they might be buried, being carried to that mountain below the ſurface of the earth. The ſtate of future felicity, in which the Phariſees believed, was very groſs: They imagined, that men in the next world, as well as in the preſent, were to eat and drink, and enjoy the pleaſures of love, each being reunited to his former wife. Hence the Sadducee, who believed in no reſurrection, and ſuppoſed our Saviour to teach it as a Phariſee, very ſhrewdly urged the difficulty of diſpoſing of the woman who had in this world been the wife of ſeven huſbands. Had the reſurrection of Chriſtianity been the Phariſaical reſurrection, this difficulty would have been inſurmountable; and accordingly we find the people, and even ſome of the Phariſees themſelves, ſtruck with the manner in which our Saviour removed it.

This ſect ſeems to have had ſome confuſed notions, probably derived from the Chaldeans and Perſians, reſpecting the pre-exiſtence of ſouls; and hence it was that Chriſt's diſciples aſked him concerning the blind man (John ix. 2.), 'Who did ſin, this man or his parents, that he was born blind?' And when the diſciples told Chriſt, that ſome ſaid he was Elias, Jeremias, or one of the prophets (Mat. xvi. 14.), the meaning can only be, that they thought he was come into the world with the ſoul of Elias, Jeremias, or ſome other of the old prophets, tranſmigrated into him. With the Eſſenes, they held abſolute predeſtination; and with the Sadducees free-will: but how they reconciled theſe ſeemingly incompatible doctrines is nowhere ſufficiently explained. The ſect of the Phariſees was not extinguiſhed by the ruin of the Jewiſh commonwealth. The greateſt part of the modern Jews are ſtill of this ſect; being as much devoted to traditions or the oral law as their anceſtors were. See the articles Cabbalists, Caraites, Essenes, Sadducees, &c.

PHARMACA, among the ancients, meant medicated or enchanted compoſitions of herbs, minerals, &c. ſome of which, when taken inwardly, were ſuppoſed to cauſe blindneſs, madneſs, love, &c.: others infected by touch; ſuch was the garment ſent by Medea to Creuſa, prepared *ſecundum artem*: and others operated upon perſons at a diſtance. *Pharmaca ſoteria* were employed as antidotes againſt theſe miſchievous compoſitions: Thus the herb *moly* preſerved Ulyſſes from the magical influence of Circe. The laurel, the rhamnus, the flea-bane, the jaſper-ſtone, were uſed for ſimilar purpoſes. See *Potter's Græc. Ant.*

PHARMACI, were two perſons who were employed in the luſtration or purification of cities. Some ſay they were both men; but others maintain, that a man to repreſent the males, and a woman to repreſent the females, performed this office. They performed ſacrifice, and wore figs about their necks called ολκαδες, thoſe of the man were blackiſh, and thoſe of the woman white. Figs were an emblem of fertility, which they doubtleſs prayed for on theſe ſolemn occaſions.

PHARMACEUTICAL, any thing connected with pharmacy, or the operations or proceſſes employed in the preparation of medicines.

PHARMACOCHEMIA, an old term denoting that part of the chemical art which treats of the preparation of medicines; by way of diſtinction from that chemiſtry which is wholly employed about the tranſmutation of metals by means of the philoſopher's ſtone; this being called *ſpagirico-chemia*.

PHARMACOLOGY, is a treatiſe of medicines, or the art of preparing them, judging of them, &c.

PHARMACOPOEIA (from φαρμακον *remedy*, and ποιειν *to make*), means a diſpenſatory, or a treatiſe deſcribing the preparations of the ſeveral kinds of medicines, with their uſes, manner of application, &c.

We have various pharmacopœias, as thoſe of Bauderon, Quercetan, Zwelfer, Charas, Bates, Salmon, Lemery, Lewis, &c. But the Edinburgh, London, and Dublin pharmacopœias, are chiefly conſulted and followed in Britain in the preſent day.

PHARMACOPOLA, or Pharmacopeius, an apothecary, or a perſon who prepares and ſells medicines; but this word is rarely uſed but in the way of ridicule. It is compoſed of φαρμακον, *medicine*, and πολειν, to ſell. Hor. Sat. ii. lib. i. ver. 1.

PHARMACUM, φαρμακον, a medicine or medicament, either of a ſalutary or deleterious quality.

PHARMACY, the art of preparing, preſerving, and compounding medicines. See Materia Medica. See alſo Prescriptions, *Extemporaneous*.

PHAROS, (Homer, Strabo, &c.), a ſmall oblong iſland, adjoining to the continent of Egypt, over-againſt Alexandria. On this iſland ſtood a cognominal light-tower, of four ſides, each ſide a ſtadium in length; and the tower ſo high as to be ſeen 100 miles off. Some affirm, each of its four corners reſted on a large ſea-crab of glaſs or of hard tranſparent ſtone of Ethiopia or Memphis. Others imagine the crabs were only added externally to the baſe by way of ornament, or as emblematical of its ſituation and uſe. The architect was Soſtrates the Cnidian, as appears by an inſcription on the tower, under Ptolemy Philadelphus, who laid out 800 talents upon it. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called *the key of the Egyptian ſea*, or even of Egypt itſelf (Lucan): and Pharos, from being a proper name, became an appellative to denote all light-houſes.

Pharos, or *Phare*, a light-houſe; a pile raiſed near a port, where fire is kept burning in the night, to guide and direct veſſels near at hand. The pharos of Alexandria, built in the iſland of Pharos, at the mouth of the Nile, was anciently very famous, inſomuch as to communicate its name to all the reſt. This moſt magnificent tower conſiſted of ſeveral ſtories and galleries, with a lantern at top, in which a light being continually burning, might be ſeen for many leagues at ſea, and along the coaſt. It was accounted one of the ſeven wonders of the world. It was built by the famed architect Soſtrates, a native of Cnidos, or, according to ſome, by Deiphanes, the father of Soſtrates; and coſt Ptolemy Philadelphus 800 talents. The ſeveral ſtories were adorned with columns, balluſtrades, galleries of the fineſt marble and workmanſhip; to which ſome add, that the architect had contrived to faſten ſome looking-glaſſes ſo artificially againſt the higheſt galleries, that one could ſee in them all the ſhips that ſailed on the ſea for a great way. Inſtead of which noble ſtructure, one ſees now only a kind of irregular caſtle, without ditches or outworks of any ſtrength, the whole being accommodated to the inequality of the ground on which it ſtands, and which it ſeems is no higher than that which it ſhould command. Out of the midſt of this clumſy building riſes a tower, which ſerves for a light-houſe, but which hath nothing of the beauty and grandeur of the old one. The Coloſſus of Rhodes alſo ſerved as a pharos.

PHARPAR, or Pharphar, is one of the rivers of Damaſcus, or rather it is an arm of the Barrady or Chryſorrhoas, which waters the city of Damaſcus and the country about it (2 Kings v. 12.). "Are not Abana and Pharpar, rivers of Damaſcus, better than all the waters of Iſrael?" The river of Damaſcus has its fountain in the mountains of Libanus. At its approach to the city it is divided into three arms, one of which paſſes through Damaſcus. The other two water the gardens round about, and then reuniting, they loſe themſelves at four or five leagues from the city, towards the north. See *Maundrell's Travels from Aleppo to Jeruſalem*; ſee alſo the articles Abana and Damascus.

PHARSALIA, Pharsalium, *Pharſalus*, or *Pharſalos*, in *Ancient Geography*, a town of the Phthiotis, a diſtrict of Theſſaly, near Pheræ and Lariſſa, to which laſt place Pompey fled from the plains of Pharſalus; watered by the river Enipeus, which falls into the Apidanus, and both together into the Peneus. Between Pharſalus and Enipeus, Pompey drew up his men at the fatal battle of Pharſalia.

In this battle, the advantage with reſpect to numbers was greatly on the ſide of Pompey. That general himſelf was on the left with the two legions which Cæſar had returned to him at the beginning of the war. Scipio, Pompey's father in-law, was in the centre, with the legions he had brought from Syria, and the reinforcements ſent by ſeveral kings and ſtates of Aſia. The Cilician legion, and ſome cohorts which had ſerved in Spain, were in the right, under the command of Afranius. As Pompey's right wing was covered by the Enipeus, he ſtrengthened the left with his ſlingers, archers, and the 7000 Roman horſe, on whom chiefly his party founded their hopes of victory. The whole army was drawn up in three lines, with very little ſpaces between them. In conformity to this diſpoſition, Cæſar's army was drawn up in the following order: The tenth legion, which had on all occaſions ſignalized itſelf above all the reſt, was placed in the right wing, and the ninth in the left; but as the latter had been conſiderably weakened in the action at Dyrrhachium, the eighth legion was poſted ſo near as to be able to ſupport and reinforce it upon occaſion. The reſt of Cæſar's forces filled up the ſpace between the two wings. Marc Antony commanded the left wing, Sylla the right, and Cneius Domitius Calvinus the main body. As for Cæſar, he poſted himſelf in the right over-againſt Pompey, that he might have him always in his ſight.

Thus was the whole plain covered, from Pharſalia to the Enipeus, with two armies, dreſſed and armed after the ſame manner, and bearing the ſame enſigns, the Roman eagles. Pompey obſerving how well the enemy kept their ranks, expecting quietly the ſignal of battle, and on the contrary how impatient and unſteady his own men were, running up and down in great diſorder for want of experience, he began to be afraid leſt his ranks ſhould be broken upon the firſt onſet; and therefore commanded the foot in the front to keep their ground, and quietly wait for the enemy. The two armies, though within reach of each other, kept a mournful ſilence; but at length the trumpets ſounded the charge, and Cæſar's army advanced in good order to begin the attack, being encouraged by the example of one Caius Craſtinus, a centurion, who at the head of 120 men, threw himſelf upon the enemy's firſt line with incredible fury. This he did to acquit himſelf of a promiſe he had ſolemnly made to Cæſar, who, meeting him as he was going out of his tent in the morning, aſked him, after ſome diſcourſe, *What his opinion was touching the event of the battle?* To which he, ſtretching out his hand, replied aloud, *Thine is the victory, Cæſar; thou ſhalt gloriouſly conquer, and I myſelf this day will be the ſubject of thy praiſe either dead or alive.* In purſuance of this promiſe he broke out of his rank as ſoon as the trumpet ſounded; and, at the head of his company, ran in upon the enemy, and made a great ſlaughter of them. But while he was ſtill preſſing forward, forcing his way through the firſt line, one of Pompey's men ran him in at the mouth with ſuch violence, that the point of his ſword came out at the hind part of his neck. Upon his death Pompey's ſoldiers took courage, and with great bravery ſtood the enemy's onſet. While the foot were thus

Pharſalia.

fiercely engaged in the centre, Pompey's horſe in the left wing marched up confidently; and having firſt widened their ranks, with a deſign to ſurround Cæſar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæſar ordered his horſe to retreat a little, and give way to the ſix cohorts, which he had poſted in the rear as a body of reſerve. Theſe, upon a ſignal given, coming up, charged the enemy's horſe with that reſolution and good order which is peculiar to men who have ſpent all their lives in camps. They remembered their inſtructions, not ſtriking at the legs or thighs of the enemy, but aiming only at their faces. This unexpected and new manner of fighting had the deſired effect. For the young patricians, whom Cæſar contemptuouſly calls the *pretty young dancers*, not being able to bear the thoughts of having their faces deformed with ſcars, turned their backs, and, covering their faces with their hands, fled in the utmoſt confuſion, leaving the foot at the mercy of the enemy. Cæſar's men did not purſue the fugitives; but charging the foot of that wing, now naked and unguarded, ſurrounded them, and cut moſt of them in pieces.

Pompey was ſo tranſported with rage, in ſeeing the flower of his forces thus put to flight or cut in pieces, that he left his army, and retired ſlowly towards his camp, looking more like a man diſtracted and beſide himſelf than one who by his exploits had acquired the name of *the Great*. When he had reached the camp, he retired to his tent without ſpeaking a word to any; and continued there, like one diſtracted and out of his ſenſes, till his whole army was defeated. Cæſar no ſooner ſaw himſelf maſter of the field than he marched to attack the enemy's entrenchments, that Pompey might not have time to recollect himſelf. When Pompey was informed that his rival was advancing to attack his entrenchments, he then firſt ſeemed to have recovered his ſenſes, and cried out, *What, into my camp too!* He ſaid no more; but immediately laying aſide the marks of his dignity, and putting on ſuch a garment as might beſt favour his flight, he ſtole out at the decuman gate, and took the road to Lariſſa, which city had hitherto ſhown great attachment to him. In the mean time Cæſar began the attack on the enemy's camp, which was vigorouſly defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæſar was not a little ſurpriſed, when, after having forced the entrenchments, he found the enemy's tents and pavilions richly adorned with carpets and hangings, their couches ſtrewed with flowers, their tables ready ſpread, and ſideboards ſet out with abundance of plate, bowls, and glaſſes, and ſome of them even filled with wine. So great was the confidence of Pompey's party, that they made preparations beforehand for pleaſures to be enjoyed after the victory, which they thought certain. In Pompey's tent, Cæſar found the box in which he kept his letters: but, with a moderation and magnanimity worthy of himſelf, he burnt them all, without reading one; ſaying, that he had rather be ignorant of crimes, than obliged to puniſh them.

The next day, when the dead were numbered, it appeared that Cæſar had ſcarce loſt 200 men; among whom was about 30 centurions, whom Cæſar cauſed to be buried with great ſolemnity. He did particular honours to the body of Craſtinus, who had begun the battle; and ordered his aſhes to be depoſited in a tomb, which he erected to his memory. On Pompey's ſide, the number of the dead amounted to 15,000 according to ſome, and to 25,000 according to others. Cæſar took 24,000 priſoners, eight eagles, and 180 enſigns.

PHARSALIA, an epic poem, compoſed by Lucan on the civil war between Pompey and Cæſar, and particularly on the victory of the latter over the former of which we have given an account in the preceding article. It is a poem univerſally acknowledged to have great beauties and great defects; but we are the leſs capable of eſtimating its merit as a whole, that either time has deprived us of the laſt books, or its author has left it incomplete. "The ſubject of the Pharſalia (ſays an excellent critic) carries undoubtedly all the epic grandeur and dignity: neither does it want unity of object, viz. the triumph of Cæſar over the Roman liberty. In the choice of that ſubject, he thinks, however, that the author was not happy. The civil wars were too recent to admit in the deſcription of them the embelliſhments of fiction and machinery. The fables of the gods mixed with the exploits of Cæſar and Pompey, inſtead of raiſing, would have diminiſhed, the dignity of ſuch well known facts." Another objection to the ſubject, perhaps more forcible than this, ariſes from the ſucceſs of the war and the abilities of the generals. Lucan was a friend to liberty, and wiſhed to raiſe the character of Pompey and Cato; but in ſpite of his utmoſt efforts, they are always eclipſed by the ſuperior talents and conſequent ſucceſs of Cæſar. All his characters, however, are drawn with ſpirit, and with uncommon regard to truth; and ſome of the ſpeeches which he puts into the mouths of his heroes are equal for moral ſublimity to any thing that is to be found in all antiquity.

Blair's Lecture

"There are in the Pharſalia (continues the critic already quoted) ſeveral very poetical and ſpirited deſcriptions. But the author's chief ſtrength does not lie either in narration or deſcription. His narration is often dry and harſh; his deſcriptions are often overwrought, and employed too upon diſagreeable objects. His principal merit conſiſts in his ſentiments, which are generally noble and ſtriking, and expreſſed in that glowing and ardent manner which peculiarly diſtinguiſhes him. Lucan is the moſt philoſophical and the moſt public-ſpirited poet of all antiquity. He was the nephew of the famous Seneca the philoſopher; was himſelf a Stoic; and the ſpirit of that philoſophy breathes throughout his poem. We muſt obſerve, too, that he is the only ancient epic poet whom the ſubject of his poem really and deeply intereſted. Lucan recounted no fiction. He was a Roman, and had felt all the direful effects of the Roman civil wars, and of that ſevere deſpotiſm which ſucceeded the loſs of liberty. His high and bold ſpirit made him enter deeply into this ſubject, and kindle, on many occaſions, into the moſt real warmth. Hence, he abounds in exclamations and apoſtrophes, which are almoſt always well-timed, and ſupported with a vivacity and fire that do him no ſmall honour.

"But it is the fate of this poet, that his beauties can never be mentioned, without their ſuggeſting his blemiſhes alſo. As his principal excellency is a lively and glowing genius, which appears ſometimes in his deſcriptions, and very often in his ſentiments, his great defect in both is want of moderation. He carries every thing to an extreme. He knows not where to ſtop. From an effort to aggrandize his objects, he becomes tumid and unnatural: and it frequently happens, that where the ſecond line of one of his deſcriptions is ſublime, the third, in which he meant to riſe ſtill higher, is perfectly bombaſt. Lucan lived in an age when the ſchools of the declaimers had begun to corrupt the eloquence and taſte of Rome. He was not free from the infection; and too often, inſtead of ſhowing the genius of the poet, betrays the ſpirit of the declaimer; but he is, on the whole, an author of lively and original genius."

PHARUS, a genus of plants belonging to the monœcia claſs; and in the natural method ranking under the fourth order, *Gramina*. See BOTANY *Index*.

PHARYNX, ſee ANATOMY, N° 92.

PHASCUM, a genus of plants of the order of muſci, belonging to the cryptogamia claſs. See BOTANY *Index*.

PHASEOLUS, the KIDNEY-BEAN; a genus of plants, belonging to the diadelphia claſs. See BOTANY *Index*.

PHASES, in *Aſtronomy*, from the Greek word φαινω, "to appear;" the ſeveral appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets. See ASTRONOMY.

PHASGA, or PISGAH, (Moſes), a mountain on the other ſide Jordan, joined to Abarim and Nebo, and running ſouth to the mouth of the Arnon: from which Moſes had a view of the promiſed land, and where he died, having before appointed Joſhua his ſucceſſor. Wells takes Piſgah and Nebo to be different names of one and the ſame mountain, a part or branch of the mountains Abarim, (Deut. xxxii. 49. compared with Deut. xxxiv. 1.). Or that the top of Nebo was peculiarly called *Piſgah;* or ſome other part of it, cut out in ſteps, as the primitive word denotes: and thus it is rendered by Aquila, by a Greek word ſignifying *cut out* (Jerome). There was alſo a city of this name, *id.;* and the adjoining country was in like manner called *Piſgah*, id.

PHASIANUS, a genus of birds belonging to the order of gallinæ. See ORNITHOLOGY *Index*.

PHASIS, a river which falls into the Euxine ſea about 700 miles from Conſtantinople. "From the Iberian Caucaſus (ſays Gibbon), the moſt lofty and craggy mountains of Aſia, that river deſcends with ſuch oblique vehemence, that in a ſhort ſpace it is traverſed by 120 bridges. Nor does the ſtream become placid and navigable till it reaches the town of Sarapana, five days journey from the Cyrus, which flows from the ſame hills, but in a contrary direction, to the Caſpian lake. The proximity of theſe rivers has ſuggeſted the practice, or at leaſt the idea, of wafting the precious merchandiſe of India down the Oxus, over the Caſpian, up the Cyrus, and with the current of the Phaſis into the Euxine and Mediterranean ſeas. As it ſucceſſively collects the ſtreams of the plain of Colchos, the Phaſis moves with diminiſhed ſpeed, though accumulated weight. At the mouth it is 60 fathom deep, and half a league broad: but a ſmall woody iſland is interpoſed in the midſt of the channel: the water, ſo ſoon as it has depoſited an earthy or metallic ſediment, floats on the ſurface of the waves, and is no longer ſuſceptible of corruption. In a courſe of 100 miles, 40 of which are navigable for large veſſels, the Phaſis divides the celebrated region of Colchos or Mingrelia, which, on three ſides, is fortified by the Iberian and Armenian mountains, and whoſe maritime coaſt extends about 200 miles from the neighbourhood of Trebizond to Dioſcurias and the confines of Circaſſia. Both the ſoil and climate are relaxed by exceſſive moiſture: 28 rivers, beſides the Phaſis and his dependent ſtreams, convey their waters to the ſea; and the hollowneſs of the ground appears to indicate the ſubterraneous channels between the Euxine and the Caſpian."

Decline and Fall of the Roman Empire.

PHASMATA, in *Phyſiology*, certain appearances, ariſing from the various ſhades of colour in the clouds by the light from the heavenly bodies, chiefly the ſun and moon. Theſe are infinitely diverſified by the different figures and ſituations of the clouds, and the appulſes of the rays of light; and, together with the occaſional flaſhings and ſtreamings of different meteors, they have, no doubt, occaſioned thoſe prodigies of armies fighting in the air, &c. of which we have ſuch frequent accounts in many writers. See 2 Maccab. xi. 8. Melancth. Meteor. 2. Shel. de Comet. ann. 1618.

Kircher and Schottus have erroneouſly attempted to explain the phenomenon from the reflection of terreſtrial objects made on ſmoke and congealed clouds in the middle region of the air, which, according to them, have the effect of a mirror. Thus, according to thoſe authors, the armies pretended by ſeveral hiſtorians to have been ſeen in the ſkies, were no other than the reflection of the like armies placed on ſome part of the earth. See *Hiſt. Acad. Roy. Scienc.* ann. 1726. p. 475. *et ſeq.*

PHEASANT. See PHASIANUS, ORNITHOLOGY *Index*.

PHEASANT's-eye, or Bird's-eye. See ADONIS, BOTANY *Index*.

PHEBE, a deaconeſs of the port of Corinth, called *Cenchrea*. St Paul had a particular eſteem for this holy woman; and Theodoret thinks the apoſtle lodged at her houſe for ſome time, while he continued in or near Corinth. It is thought ſhe brought to Rome the epiſtle he wrote to the Romans, wherein ſhe is commended and recommended in ſo advantageous a manner. He ſays (Rom. xvi. 1, 2.), "I commend unto you Phebe our ſiſter, which is a ſervant of the church which is at Cenchrea: that ye receive her in the Lord, as becometh ſaints, and that ye aſſiſt her in whatſoever buſineſs ſhe hath need of you; for ſhe hath been a ſuccourer of many, and of myſelf alſo." Some moderns have advanced a notion, that Phebe was wife to St Paul; but none of the ancients have ſaid any thing like it. It is thought, in quality of deaconeſs, ſhe was employed by the church in ſome miniſtrations ſuitable to her ſex and condition; as to viſit and inſtruct the Chriſtian women, to attend them in their ſickneſs, and diſtribute alms to them.

PHEGOR, or PEOR, a deity worſhipped at a very early period by the Midianites and Moabites, and probably by all the other tribes which then inhabited Syria. Much has been ſaid concerning the form of this god, and the rank which he held among the Sygan divinities (ſee *BAAL-Peor*); and many conjectures have been formed concerning the origin of his name. Moſt of theſe ſeem to have no better foundation than the ſenſeleſs dreams of the Jewiſh rabbies. PHEGOR, or PEOR, is undoubtedly the ſame with the Hebrew word *pechor*, which ſignifies *aperuit*, and probably refers to the prophetic influence always attributed to the ſolar deity, by which he *opened* or *diſcovered* things to come. Accordingly we find PHEGOR or PEOR generally joined to *Baal*, which was the Syrian and Chaldean name of the ſun after he became an object of worſhip; hence *Baal-PHEGOR* muſt have been the ſun worſhipped by ſome particular rites, or under ſome particular character. What theſe were, a reſolution of *Pechor* into its component parts may perhaps inform us. As this word, wherever it occurs in Scripture, has ſome relation to diſtending or opening the mouth wide, it is probably compounded of PHAH the *mouth* or *face*, and EHAR *naked*. In thoſe countries we know that the women wore veils; but it would appear, that in celebrating the rites of this deity they were unveiled. It ſeems even not improbable, that on theſe occaſions the ſexes danced promiſcuouſly without their clothes; a practice which would naturally give birth to the licentious amours mentioned in the 25th chapter of the book of Numbers. If this be admitted, it will follow that *Phegor* was the ſun preſiding over the myſteries of Venus.

PHELLANDRIUM, WATER-HEMLOCK; a genus of plants belonging to the pentandria claſs. See BOTANY *Index*.

Hill's Hiſt. of Foſſils, p. 490.

PHENGITES, among the ancients, the name of a beautiful ſpecies of alabaſter. It is a rude irregular maſs, very ſhattery and friable, but of a brightneſs ſuperior to that of moſt other marbles, and excelling them all in tranſparence. The colour is an agreeable pale, yellowiſh white, or honey colour; the yellowiſh is more intenſe in ſome places than in others, and ſometimes makes an obſcure reſemblance of veins. It is very weak and brittle in the maſs; and when reduced to ſmall pieces, may be eaſily crumbled between the fingers into looſe, but conſiderably large angular pieces, ſome perfect, others complex, irregular, or mutilated, and all approaching to a flat ſhape. The ancients were very fond of this ſpecies in public buildings; and the temple of Fortune, built entirely of it has long been celebrated. Its great beauty is its tranſparence, from which alone this temple was perfectly light when the doors were ſhut, though it was built without a window, and had no other light but what was tranſmitted through the ſtone of which the walls were built. It was anciently found in Cappadocia, and is ſtill plentiful there: we have it alſo in Germany and France, and in our own kingdom in Derbyſhire, and ſome other counties. It takes an excellent poliſh, and is very fit for ornamental works, where no great ſtrength is required.

PHENICE, a port of the iſland of Crete, to the weſt of the iſland. St Paul having anchored at Phenice, when he was carried to Rome (Acts xxvii. 12.), adviſed the ſhip's crew to ſpend the winter there, becauſe the ſeaſon was too far advanced.

PHENICIA. See PHOENICIA.

PHEONS, in *Heraldry*, the barbed heads of darts, arrows, or other weapons.

PHEOS, in *Botany*, a name which Theophraſtus, Dioſcorides, and others, give to a plant uſed by fullers in dreſſing their cloths, and of which there were two kinds, a ſmaller called ſimply *pheos*, and a larger called *hippopheos*. This plant is ſometimes called *phleos*; and is thus confounded with a kind of marſh cudweed, or *gnaphalium*, called alſo by that name; but it may always be diſcovered which of the two plants an author means, by obſerving the ſenſe in which the word is uſed, and the uſe to which the plant was put. The *phleos*, properly ſo called, that is, the cudweed, was uſed to ſtuff beds and other ſuch things, and to pack up with earthen veſſels to prevent their breaking; but the pheos, improperly called *phleos*, only about cloths: this was, however, alſo called *ſtæbe* and *cnaphon*.

PHERECRATES, a Greek comic poet, was contemporary with Plato and Ariſtophanes. After the example of the ancient comedians, who never introduced upon the theatre imaginary but living characters, he acted his contemporaries. But he did not abuſe the liberty which at that time prevailed upon the ſtage; and laid it down as a rule to himſelf never to deſtroy the reputation of any perſon. Twenty-one comedies are attributed to him, of which there now only remain ſome fragments collected by Hertelius and Grotius. From theſe fragments, however, it is eaſy to diſcern, that Pherecrates wrote the pureſt Greek, and poſſeſſed that ingenious and delicate raillery which is called *attic urbanity*. He was author of a kind of verſe called, from his own name, *Pherecratick*. The three laſt feet were in hexameter verſe, and the firſt of thoſe three feet was always a ſpondee. This verſe of Horace (for example, *Quamvis pontica pinus*) is a Pherecratick verſe. We find in Plutarch a fragment of this poet upon the muſic of the Greeks, which has been critically examined by M. Burette of the academy of inſcriptions. See the 15th volume of the collection publiſhed by that learned ſociety.

PHERECYDES, a native of Scyros, flouriſhed about the year 560 before the Chriſtian era, and was diſciple of Pittacus, one of the ſeven wiſe men of Greece (ſee PITTACUS). He is ſaid to have been the firſt of all the philoſophers who has written on natural ſubjects and the eſſence of the gods. He was alſo the firſt, it is ſaid, who held the ridiculous opinion, "that animals are mere machines." He was Pythagoras's maſter, who loved him as his own father. This grateful ſcholar having heard that Pherecydes lay dangerouſly ill in the iſland of Delos, immediately repaired thither, in order to give every neceſſary aſſiſtance to the old man, and to take care that no means ſhould be left untried for the recovery of his health. His great age, however, and the violence of his diſeaſe, having rendered every preſcription ineffectual, his next care was to ſee him decently buried; and when he had paid the laſt duty to his remains, and erected a monument to his memory, he ſet out again for Italy. Other cauſes have been aſſigned for the death of Pherecydes: ſome ſay he was eaten up by lice, and others that he fell headlong from the top of Mount Corycius in his way to Delphos. He lived to the age of 85 years, and was one of the firſt proſe writers among the Greeks.

Enfield's Hiſtory of Philoſophy.

"Marvellous circumſtances have been related of him, which only deſerve to be mentioned, in order to ſhow that what has been deemed ſupernatural by ignorant

Pherecydes ‖ Phidias.

ſpectators may be eaſily conceived to have happened from natural cauſes. A ſhip in full ſail was at a diſtance approaching its harbour; Pherecydes predicted that it would never come into the haven, and it happened accordingly; for a ſtorm aroſe which ſunk the veſſel. After drinking water from a well, he predicted an earthquake, which happened three days afterwards. It is eaſy to ſuppoſe that theſe predictions might have been the reſult of a careful obſervation of thoſe phenomena which commonly precede ſtorms or earthquakes in a climate where they frequently happen.

"It is difficult to give in any degree an accurate account of the doctrines of Pherecydes; both becauſe he delivered them, after the manner of the times, under the concealment of ſymbols; and becauſe very few memoirs of this philoſopher remain. It is moſt probable that he taught theſe opinions concerning the gods and the origin of the world which the ancient Grecian theogoniſts borrowed from Egypt;" and of which the reader will find accounts in different articles of this work. See EGYPT, METAPHYSICS, MYSTERIES, MYTHOLOGY, and POLYTHEISM.

PHERETIMA, was the wife of Battus king of Cyrene, and the mother of Arceſilaus. After her ſon's death, ſhe recovered the kingdom by means of Amaſis king of Egypt, and to avenge the murder of Arceſilaus, ſhe cauſed all his aſſaſſins to be crucified round the walls of Cyrene, and ſhe cut off the breaſts of their wives, and hung them up near the bodies of their huſbands. It is ſaid that ſhe was devoured alive by worms; a puniſhment which, according to ſome of the ancients, was inflicted by Providence for her unparalleled cruelties.

PHIAL, a well-known veſſel made of glaſs, uſed for various purpoſes.

Leyden PHIAL, is a phial of glaſs coated on both ſides with tin-foil for a conſiderable way up the ſides, of great uſe in electrical experiments. The diſcovery that electricity may be accumulated in an apparatus of this kind, was originally made in the year 1745 by Mr Von Kleiſt, dean of the cathedral in Comin. But this remarkable property was firſt ſatisfactorily obſerved at Leyden, with a bottle containing ſome water which ſerved for the inſide coating, and the accidental application of the hands on the outſide ſerved for another coating. Hence a bottle coated on both ſides for the purpoſe of being charged with electricity, has received the name of *Leyden phial*, or otherwiſe *electric jar*. See ELECTRICITY, *paſſim*.

PHIDIAS, the moſt famous ſculptor of antiquity, was an Athenian, and a contemporary of the celebrated Pericles, who flouriſhed in the 83d Olympiad. This wonderful artiſt was not only conſummate in the uſe of his tools, but accompliſhed in thoſe ſciences and branches of knowledge which belong to his profeſſion, as hiſtory, poetry, fable, geometry, optics, &c. He firſt taught the Greeks to imitate nature perfectly in this way; and all his works were received with admiration. They were alſo incredibly numerous; for it was almoſt peculiar to Phidias, that he united the greateſt facility with the greateſt perfection. His Nemeſis was ranked among his firſt pieces: it was carved out of a block of marble, which was found in the camp of the Perſians after they were defeated in the plains of Marathon. He made an excellent ſtatue of Minerva for the Plateans; but the ſtatue of this goddeſs in her magnificent temple at Athens, of which there are ſtill ſome ruined remains, was an aſtoniſhing production of human art. Pericles, who had the care of this pompous edifice, gave orders to Phidias, whoſe prodigious talents he well knew, to make a ſtatue of the goddeſs; and Phidias formed a figure of ivory and gold 39 feet high. Writers never ſpeak of this incomparable monument of ſkill without raptures; yet what has rendered the name of the artiſt immortal, proved at that time his ruin. He had carved upon the ſhield of the goddeſs his own portrait and that of Pericles; and this was, by thoſe that envied them, made a crime in Phidias. He was alſo charged with embezzling part of the materials which were deſigned for the ſtatue. Upon this he withdrew to Elis, and revenged himſelf upon the ungrateful Athenians, by making for the Elians the Olympic Jupiter: a prodigy of art, and which was afterwards ranked among the ſeven wonders of the world. It was of ivory and gold; 60 feet high, and every way proportioned. "The majeſty of the work did equal the majeſty of the god (ſays Quintilian), and its beauty ſeems to have added luſtre to the religion of the country." Phidias concluded his labours with this maſterpiece: and the Elians, to do honour to his memory, erected, and appropriated to his deſcendants, an office, which conſiſted in keeping clean this magnificent image.

Phidias ‖ Philadelphia.

PHIDITIA, in Grecian antiquity, feaſts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor aſſiſted at them equally, and on the ſame footing; their deſign being to keep up peace, friendſhip, good underſtanding, and equality among the citizens great and ſmall. It is ſaid that thoſe who attended this feaſt brought each a buſhel of flour, eight meaſures of wine named *chorus*, five pounds of cheeſe, and two pounds and a half of figs, with ſome money.

PHILA, in *Mythology*, one of the attributes of Venus, which diſtinguiſhes her as the mother of love, from φιλειν *to love*.

PHILADELPHIA, in antiquity, were games inſtituted at Sardis to celebrate the union of Caracalla and Geta, the ſons of Septimius Severus.

PHILADELPHIA, the capital of the ſtate of Penſylvania in North America, ſituated in W. Long. 75. 8. N. Lat. 39. 57. It is one of the moſt beautiful and regular cities in the world, being of an oblong form, ſituated on the weſt bank of the river Delaware, on an extenſive plain, about 118 miles (ſome ſay more) from the ſea. The length of the city eaſt and weſt, that is, from the Delaware to the Schuylkill, upon the original plan of Mr Penn, is about three miles, and the breadth, north and ſouth, rather leſs than one mile. Not two fifths of the plot covered by the city charter is yet built. The inhabitants, however, have not confined themſelves within the original limits of the city, but have built north and ſouth along the Delaware two miles in length. The longeſt ſtreet is Second-ſtreet, about 700 feet from Delaware river, and parallel to it. The circumference of that part of the city which is built, if we include Kenſington on the north and Southwark on the ſouth, may be about five miles. Market-ſtreet is 100 feet wide, and runs the whole length of the city from river to river. Near the middle, it is interſected at right angles by Broad-ſtreet, 113 feet wide, running nearly north and ſouth quite acroſs the city.

Between Delaware river and Broad-ſtreet are 14 ſtreets, nearly equidiſtant, running parallel with Broad-ſtreet acroſs the city; and between Broad-ſtreet and the Schuylkill, there are nine ſtreets equidiſtant from each other. Parallel to Market-ſtreet are eight other ſtreets, running eaſt and weſt from river to river, and interſecting the croſs ſtreets at right angles; all theſe ſtreets are 50 feet wide, except Arch-ſtreet, which is 65 feet wide. All the ſtreets which run north and ſouth, except Broad-ſtreet mentioned above, are 50 feet wide. There were four ſquares of eight acres each, one at each corner of the city, originally reſerved for public and common uſes. And in the centre of the city, where Broad ſtreet and Market-ſtreet interſect each other, is a ſquare of ten acres, reſerved in like manner, to be planted with rows of trees for public walks. This city was founded in 1682 by the celebrated William Penn, who in October 1701 granted a charter incorporating the town with city privileges. In 1749 the dwelling-houſes were computed, and found to be 2076; in 1794, they amounted to 9000. They are in general handſomely built of brick; and contain 55,000 inhabitants, compoſed of almoſt all nations and religions. Their places for religious worſhip are as follows: The Friends or Quakers have five, the Preſbyterians ſix, the Epiſcopalians three, the German Lutherans two, the German Calviniſts one, the Catholics three, the Swediſh Lutherans one, the Moravians one, the Baptiſts one, the Univerſal Baptiſts one, the Methodiſts two, the Jews one.

The other public buildings in the city, beſides the univerſity, academies, &c. are the following, viz. a ſtate-houſe and offices, a city court-houſe, a county court-houſe, a carpenter's hall, a philoſophical ſociety's hall, a diſpenſary, an hoſpital and offices, an alms-houſe, a houſe of correction, a public factory of linen, cotton, and woollen, a public obſervatory, three brick market houſes, a fiſh-market, a public gaol.

In Philadelphia there are 304 ſquares, and about 34 ſtreets, many of which are very broad, and all of them neat and elegant, lighted by 662 lamps of two branches each, and conſuming annually about 9000 gallons of oil. Here is a library which owed its origin to Dr Franklin, was incorporated in 1742, and now contains upwards of 12,000 volumes, beſides a muſeum and a valuable philoſophical apparatus. There is a new theatre in Cheſnut-ſtreet, which was finiſhed in 1793. The univerſity ſtands on the weſt ſide of Fourth-ſtreet, and was incorporated in the year 1791, the funds of which produce annually a revenue of about 2365l. and the ſtudents on an average amount to 510, 25 of whom are annually admitted to degrees. In the city and ſuburbs are 10 rope-walks, 13 breweries, 6 ſugar-houſes, 7 hair-powder manufactories, 2 rum diſtilleries, 15 manufactories of earthen ware, and the public mint for the whole United States. In the year 1791, the value of the exports amounted to 3,436,092 dollars, and in 1795, to 11,518,260. From Auguſt 1792 to the ſame month in 1793, the births amounted to 2511, and the deaths to 1497, which added to the population rather more than a thouſand. There were 8060 debtors and criminals confined in the gaol from September 28th, 1780, to September 5. 1790, of which vaſt number only twelve died a natural death; than which nothing can be a more honourable proof the great humanity with which priſoners are there treated.

The univerſity of Philadelphia was founded during the war. Its funds were partly given by the ſtate, and partly taken from the old college of Philadelphia. A medical ſchool, which was founded in 1765, is attached to the univerſity; and has profeſſors in all the branches of medicine, who prepare the ſtudents (whoſe number yearly is 50 or 60) for degrees in that ſcience. Beſides the univerſity and medical ſchool, there is the Proteſtant Epiſcopal academy, a very flouriſhing inſtitution; the academy for young ladies; another for the Friends or Quakers, and one for the Germans, beſides five free ſchools.

In Market-ſtreet, between Front and Fourth-ſtreets, is the principal market, built of brick, and is 1500 feet in length. This market, in reſpect to the quantity, the variety, and neatneſs of the proviſions, is not equalled in America, and perhaps not exceeded in the world.

The Philadelphians are not ſo ſocial, nor perhaps ſo hoſpitable, as the people in Boſton, Charleſtown, and New York. Various cauſes have contributed to this difference: among which the moſt operative has been the prevalence of party-ſpirit, which has been and is carried to greater lengths in this city than in any other in America; yet no city can boaſt of ſo many uſeful improvements in manufactures, in the mechanical arts, in the art of healing, and particularly in the ſcience of humanity. In ſhort, whether we conſider the convenient local ſituation, the ſize, the beauty, the variety and utility of the improvements, in mechanics, in agriculture, and manufactures, or the induſtry, the enterpriſe, the humanity, and the abilities, of the inhabitants of the city of Philadelphia, it merits to be viewed as the capital not only of the province, but of the flouriſhing empire of United America.

Several canals are let into the town, which add much to the beauty and convenience of the place. Its quay is 200 feet ſquare, to which ſhips of 400 or 500 tons may come up, and lay their broadſides cloſe to it; with wet and dry docks for building and repairing ſhips, beſides magazines, warehouſes, and all other conveniences for exporting and importing merchandize. Scarce any thing can appear more beautiful than the city and the adjacent country, which for ſome miles may be compared to a fine and flouriſhing garden.

Though all our readers muſt unqueſtionably have heard of the malignant fever known by the name of yellow fever, which ſome years raged in Philadelphia, it will not, we truſt, be thought improper if we give a ſhort account of that dreadful malady in this place. This account we ſhall extract from a pamphlet written by Mr Carey.

Of this fever, then, it is obſerved, that, generally ſpeaking, the mortality was not ſo great among women as among men, but that corpulent, high-fed, and drunken men, common proſtitutes, and ſuch of the poor as had been debilitated through the want of ſufficient nouriſhment, and lived in dirty and confined habitations, became an eaſy prey to it; whilſt thoſe who reſided in the ſuburbs, enjoying the benefit of country air, were little affected by it. A ſingular fact is, that the

French reſiding in Philadelphia were in a remarkable degree exempt from it; a circumſtance which cannot be accounted for. The report which prevailed here of the Africans having wholly eſcaped the diſeaſe, proves to be not altogether true, ſeveral of them having been ſeized. The fever, however, was found to yield more readily to medicine in them than in white perſons.

We find the following account of the nature and ſymptoms of the diſeaſe, as deſcribed by Dr Currie, in the third edition of the pamphlet already mentioned. "The ſymptoms which characteriſed the firſt ſtage of the fever were, in the greateſt number of caſes, after a chilly fit of ſome duration, a quick tenſe pulſe; hot ſkin; pain in the head, back, and limbs; fluſhed countenance; inflamed eye, moiſt tongue; oppreſſion and ſenſe of ſoreneſs at the ſtomach, eſpecially upon preſſure; frequent ſick qualms, and retchings to vomit, without diſcharging any thing, except the contents laſt taken into the ſtomach; coſtiveneſs. &c. And when ſtools were procured, the firſt generally ſhowed a defect of bile, or an obſtruction to its entrance into the inteſtines. But briſk purges generally altered this appearance.

"Theſe ſymptoms generally continued with more or leſs violence from one to three, four, or even five days; and then gradually abating, left the patient free from every complaint, except general debility. On the febrile ſymptoms ſuddenly ſubſiding, they were immediately ſucceeded by a yellow tinge in the opaque cornea, or whites of the eyes; an increaſed oppreſſion at the præcordia, a conſtant puking of every thing taken into the ſtomach, with much ſtraining, accompanied with a hoarſe hollow noiſe.

"If theſe ſymptoms were not ſoon relieved, a vomiting of matter reſembling coffee-grounds in colour and conſiſtence, commonly called the *black vomit*, ſometimes accompanied with or ſucceeded by hemorrhagies from the noſe, fauces, gums, and other parts of the body; a yellowiſh purple colour, and putreſcent appearance of the whole body, hiccup, agitations, deep and diſtreſſed ſighing, comatoſe delirium, and finally death, are the conſequence. When the diſeaſe proved fatal, it was generally between the fifth and eighth days.

"This was the moſt uſual progreſs of this formidable diſeaſe through its ſeveral ſtages. There were, however, very conſiderable variations in the ſymptoms as well as in the duration of its different ſtages, according to the conſtitution and temperament of the patient, the ſtate of the weather, the manner of treatment, &c.

"In ſome caſes, ſigns of putreſcency appeared at the beginning or before the end of the third day. In theſe, the black vomiting, which was generally a mortal ſymptom, and univerſal yellowneſs, appeared early. In theſe caſes, alſo, a low delirium, and great proſtration of ſtrength, were conſtant ſymptoms, and coma came on very ſpeedily.

"In ſome, the ſymptoms inclined more to the nervous than the inflammatory type. In theſe, the jaundice colour of the eye and ſkin, and the black vomiting, were more rare. But in the majority of caſes, particularly after the nights became ſenſibly cooler, all the ſymptoms indicated violent irritation and inflammatory diatheſis. In theſe caſes, the ſkin was always dry, and the remiſſions very obſcure.

"The febrile ſymptoms, however, as has been already obſerved, either gave way on the third, fourth, or fifth day, and then the patient recovered; or they were ſoon after ſucceeded by a different but much more dangerous train of ſymptoms, by debility, low pulſe, cold ſkin (which aſſumed a tawny colour, mixed with purple), black vomiting, hemorrhagies, hiccup, anxiety, reſtleſſneſs, coma, &c. Many who ſurvived the eighth day, though apparently out of danger, died ſuddenly in conſequence of a hemorrhagy."

Purging the patient with calomel and jalap appears to have proved the moſt ſucceſsful treatment; and the repeated uſe of the lancet, in caſes where no ſymptoms of putridity exiſted. Dr Griffiths, who had been ſeized with the diſeaſe, "was bled ſeven times in five days, and aſcribes his recovery principally to that operation." Dr Maeſe alſo, "in five days, loſt 72 ounces of blood, by which he was recovered when at the loweſt ſtage of the diſorder." It was generally remarked that an obſtinate coſtiveneſs took place at the commencement of the diſeaſe; and when this was removed, by purgatives, within the firſt twelve hours, the patient ſeldom failed to do well.

The work concludes with a liſt of the committee for the relief of the ſick, of which our author was a member: alſo the names of a large number of the inhabitants who were cut off, a ſeries of meteorological tables, and a general account of burials during the prevalence of this fatal complaint. From the latter we extract the following account:

" Auguſt		325
" September		1442
" October		1993
" November		118
" Jews, returned in groſs		5
" Baptiſts,	do.	6
" Methodiſts,	do.	32
" Free Quakers,	do.	39
" German part of St Mary's congregation		30
Total		4042"

It is not difficult to conceive the general diſtreſs which ſuch an evil muſt have occaſioned to perſons of every rank and deſcription. Some of the moſt ſtriking inſtances our author has related in very affecting terms; but no picture of human calamity perhaps ever exceeded the following: "A ſervant girl belonging to a family in this city, in which the fever had prevailed, was apprehenſive of danger, and reſolved to remove to a relation's houſe in the country. She was, however, taken ſick on the road, and returned to town, where ſhe could find no perſon to receive her. One of the guardians of the poor provided a cart, and took her to the alms-houſe, into which ſhe was refuſed admittance. She was brought back, and the guardian offered five dollars to procure her a ſingle night's lodging, but in vain. And in fine, after every effort made to provide her ſhelter, ſhe abſolutely expired in the cart."

We cannot diſmiſs the preſent article, though it has already extended to a ſufficient length, without giving our readers an account of a very extraordinary people who live within 50 miles of Philadelphia; where there is a little town or colony, particularly remarkable on account of its origin and the manners of the people by whom it is inhabited. It was founded by a German, Philadelphia.

who, weary of the world, returned into the country that he might be more at liberty to give himſelf up to contemplation. Curioſity brought ſeveral of his countrymen to viſit his retreat; and by degrees his pious, ſimple, and peaceable manners, induced them to ſettle near him; then they all formed a little colony, which they called Euphrates, in alluſion to the Hebrews, who uſed to ſing pſalms on the borders of that river.

This little town forms a triangle, the outſides of which are bordered with mulberry and apple trees planted with great regularity; and its inhabitants, we know not for what reaſon, are called *Dumplers*. In the middle of the town is a very large orchard, and between the orchard and thoſe ranges of trees are houſes built of wood, three ſtories high, where every Dumpler is left to enjoy the pleaſures of his meditation without diſturbance. Theſe contemplative men do not amount to above 500; and the extent of their territory is about 250 acres, bounded by a river, a piece of ſtagnated water, and a mountain covered with trees.

The men and women live in ſeparate quarters of the town, and never ſee each other but at places of worſhip; for among the Dumplers there are no aſſemblies of any kind but for public buſineſs. Their lives are ſpent in labour, prayer and ſleep. Twice every day and night they are called forth from their cells to attend divine ſervice. Like the Methodiſts and Quakers, every individual among them has the right of preaching when he thinks himſelf inſpired. The favourite ſubjects on which they diſcourſe in their aſſemblies, are humility, temperance, chaſtity, and the other Chriſtian virtues. They never violate that day of repoſe which all orders of men, whether idle or luxurious, much delight in. They admit a hell and a paradiſe; but reject the eternity of future puniſhments. They abhor the doctrine of original ſin as an impious blaſphemy; and, in general, every tenet that is ſevere to men appears to them injurious to the Divinity. As they do not allow merit to any but voluntary works, they adminiſter baptiſm only to the adult; at the ſame time, they think baptiſm ſo eſſentially neceſſary to ſalvation, that they imagine the ſouls of Chriſtians in another world are employed in converting thoſe who have not died under the law of the Goſpel. In this ridiculous opinion we have known Chriſtians of other denominations, and who boaſted a higher antiquity, that agreed with them.

Still more diſintereſted than the Quakers, they never enter into any law-ſuit. One may cheat, rob, and abuſe them, without being expoſed to any retaliation, or even to any complaint from them. On them religion has the ſame effect that philoſophy had upon the Stoics: it makes them inſenſible to every kind of inſult.

Nothing can be plainer than their dreſs. In winter it is a long white gown, from which there hangs a hood, which ſerves inſtead of a hat, a coarſe ſhirt, thick ſhoes, and very wide breeches. The women are dreſſed very much like the men, except that they have no breeches. Their common food conſiſts wholly of vegetables; not becauſe it is unlawful to eat any other, but becauſe that kind of abſtinence is looked upon as more conformable to the ſpirit of Chriſtianity, which has an averſion from blood.

Each individual follows with cheerfulneſs the branch of buſineſs allotted him; and the produce of all their labours is depoſited in a common ſtock, for the uſe of the whole. This union of induſtry has not only eſtabliſhed agriculture, manufactures, and all the arts neceſſary for the ſupport of this little ſociety, but hath alſo ſupplied, for the purpoſes of exchange, ſuperfluities proportioned to the degree of its population.

Philadelphia.

Though the two ſexes live ſeparate at Euphrates, the Dumplers do not on that account fooliſhly renounce matrimony; but thoſe who find themſelves diſpoſed to it, leave the town, and form an eſtabliſhment in the country, which is ſupported at the public expence. They repay this by the produce of their labours, which is all thrown into the public treaſury; and their children are ſent to be educated in Euphrates, which they conſider as their mother-country.—Without this wiſe privilege, the Dumplers would be no better than monks; and in proceſs of time they would become either ſavages or libertines. They are at preſent an innocent, though perhaps deluded, race.

Philadelphia, an ancient town of Turkey in Aſia, in Natolia. It is ſeated at the foot of Mount Tmolus, by the river Cogamus, from whence there is an exceeding fine view over an extenſive plain. This place was founded by Attalus Philadelphus, brother of Eumenes.

It was very liable to earthquakes, which, perhaps, aroſe from its vicinity to the region called *Catakekaumene* *. So ſevere were thoſe earthquakes, that even the city walls were not ſecure; and ſo frequent were they, that theſe experienced daily concuſſions. The inhabitants, therefore, who were not numerous, lived in perpetual apprehenſion, and their conſtant employment was in repairs. In fact, ſo great were their fears, that their chief reſidence was in the country, the ſoil of which was very fertile. Such is Strabo's account of this place. In the year 1097, it was taken by aſſault by John Ducas the Greek general. It was without difficulty reduced alſo in the year 1106, under the ſame emperor. The Turks marched from the Eaſt with a deſign to plunder it and the maritime towns. The emperor Manuel, in 1175, retired for protection from the Turks to this place. In 1300 it fell by lot to Karaman. In 1306 it was beſieged by Aliſaras, and conſiderably haraſſed; but was not taken. In 1391, this place alone refuſed to admit Bajazet; but it was at length forced to capitulate for want of proviſions. It has been matter of ſurpriſe that this town was not totally abandoned; and yet it has ſurvived many cities leſs liable to inconveniences, and is ſtill an extenſive place; though in its appearance it is poor and mean. Some remnants of its walls are ſtill ſtanding, but with large gaps. The materials of the wall are ſmall ſtones ſtrongly cemented. It is thick, lofty, and has round towers. Near this place, between the mountains, there is a ſpring of a purgative quality; it is much eſteemed, and many people reſort to it in the hot months. It taſtes like ink, is clear, but tinges the earth with the colour of ochre. The famous wall which credulity has aſſerted to be made of human bones, ſtands beyond this and beyond the town. See the next article.

When Dr Chandler was there, he tells us, * "The biſhop of Philadelphia was abſent; but the proto-papas or chief-prieſt, his ſubſtitute, whom we went to viſit, received us at his palace, a title given to a very indifferent houſe or rather a cottage of clay. We found him ignorant

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* Signifying *the burned.*

* *Travels in Greece.*

Philadelphia, Philadelphian Society.

ignorant of the Greek tongue, and were forced to diſcourſe with him by an interpreter in the Turkiſh language. He had no idea that Philadelphia exiſted before Chriſtianity, but told us it had become a city in conſequence of the many religious foundations. The number of churches he reckoned at 24, moſtly in ruins, and mere maſſes of wall decorated with painted ſaints. Only ſix are in a better condition, and have their prieſts. The epiſcopal church is large, and ornamented with gilding, carving, and holy portraits. The Greeks are about 300 families, and live in a friendly intercourſe with the Turks, of whom they ſpeak well. We were aſſured that the clergy and laity in general knew as little of Greek as the proto-papas; and yet the liturgies and offices of the church are read as elſewhere, and have undergone no alteration on that account.

"The Philadelphians are a civil people. One of the Greeks ſent us a ſmall earthen veſſel full of choice wine. Some families beneath the trees, by a rill of water, invited us to alight, and partake of their refreſhments. They ſaluted us when we met; and the aga or governor, on hearing that we were Franks, bade us welcome by a meſſenger.

"Philadelphia poſſeſſing waters excellent in dyeing, and being ſituated on one of the moſt capital roads to Smyrna, is much frequented, eſpecially by Armenian merchants. The Greeks ſtill call this place by its ancient name, but the Turks call it *Allahijur*. The number of inhabitants is about 7000 or 8000; of whom 2000 are ſuppoſed to be Chriſtians. It is about 40 miles E. S. E. of Smyrna. E. Long. 28. 15. N. Lat. 38. 28.

PHILADELPHIA-Stones, a name which ſome authors have given to what is otherwiſe called *Chriſtian bones*, found in the walls of that city. It is a vulgar error that theſe walls are built of bones; and the tradition of the country is, that when the Turks took the place, they fortified it for themſelves, and built their walls of the bones of the Chriſtians whom they had killed there. Dr Smyth in one of his epiſtles, mentions this wall as an inſtance of Turkiſh barbarity. This idle opinion has gained credit merely from a looſe and porous ſtone of the ſparry kind, found in an old aqueduct, which is ſtill in the wall. Sir Paul Rycaut brought home pieces of theſe ſtones, which even he ſuppoſed to have been bones, but they proved on examination to be various bodies, chiefly vegetable, incruſted over and preſerved in a ſpar of the nature of that which forms incruſtations in Knareſborough ſpring, and other places with us. Theſe bodies are often cemented together in conſiderable numbers by this matter, and their true ſhape loſt in the congeries, till a diligent and judicious eye traces them regularly.

PHILADELPHIAN Society, in eccleſiaſtical hiſtory, an obſcure and inconſiderable ſociety of myſtics. They were formed about the end of the laſt century by an Engliſh female fanatic, whoſe name was *Jane Leadley*. This woman, ſeduced by her viſions, predictions, and doctrines, ſeveral diſciples, among whom were perſons of learning. She believed that all diſſenſions among Chriſtians would ceaſe, and the kingdom of the Redeemer become a ſcene of charity and felicity, if Chriſtians, diſregarding the forms of doctrine or diſcipline of their ſeveral communions, would all join in committing their ſouls to the care of the internal guide, to be inſtructed, governed, and formed, by his divine impulſes and ſuggeſtions. But they went farther than this: they even pretended a divine commiſſion to proclaim the approach of this glorious communion of ſaints; and were convinced that the ſociety eſtabliſhed by themſelves was the true kingdom of Chriſt. One of her leading doctrines was, that of the final reſtoration of all intelligent beings to perfection and happineſs.

Philadelphus, Philæni.

PHILADELPHUS, in *Antiquity*, was a title or ſurname borne by ſeveral ancient kings; formed from the Greek φιλος, "friend, lover," and αδελφος, "brother:" q. d. one who loves his brother or brethren. See PTOLEMY and EGYPT.

PHILADELPHUS, the PIPE-TREE, or *Mock-orange*; a genus of plants belonging to the icoſandria claſs. See BOTANY *Index*.

The coronarius, white ſyringa, or mock-orange, has been long cultivated in the gardens of this country as a flowering ſhrub; it is not well known in what country it is to be found native. It riſes ſeven or eight feet high; ſending up a great number of ſlender ſtalks from the root. Theſe have a grey bark, branch out from their ſides, and are garniſhed with oval ſpear-ſhaped leaves. This ſhrub by its flowers makes a fine figure in May and June; for they are produced in cluſters both at the end and from the ſides of the branches. They are of a fine white colour, and exceedingly fragrant.

PHILÆNI, were two brothers, citizens of Carthage, who ſacrificed their lives for the good of their country. At the time when the Carthaginians ruled over the greateſt part of Africa, the Cyrenians were alſo a great and wealthy people. The country in the middle betwixt them was all ſandy, and of an uniform appearance. There was neither river nor mountain to diſtinguiſh their limits; a circumſtance which engaged them in a terrible and tedious war with one another. After their armies and fleets had been often routed and put to flight on both ſides, and they had weakened one another pretty much; and fearing leſt, by and by, ſome third people ſhould fall upon the conquered and conquerors together, equally weakened, upon a ceſſation of arms they made an agreement, "that upon a day appointed deputies ſhould ſet out from their reſpective homes, and the place where they met one another ſhould be accounted the common boundary of both nations." Accordingly, the two brothers called Philæni, ſent from Carthage, made all diſpatch to perform their journey. The Cyrenians proceeded more ſlowly. Theſe laſt, perceiving themſelves a little behind, and becoming apprehenſive of puniſhment at home for miſmanaging the affair, charged the Carthaginians with ſetting out before the time; made a mighty buſtle upon it; and, in ſhort, would rather chooſe any thing than go away outdone. But whereas the Carthaginians deſired any other terms, provided only they were fair, the Cyrenians made this propoſal to the Carthaginians, "either to be buried alive in the place which they claimed as the boundary to their nation, or that they would advance forward to what place they inclined upon the ſame condition." The Philæni accepting the offer, made a ſacrifice of themſelves and their lives to their country, and ſo were buried alive. The Carthaginians dedicated altars in that place to the memory of the two brothers. Theſe altars, called *Aræ Philænorum*, ſerved as a boundary to the em-the empire of the Carthaginians, which extended from this monument to Hercules's Pillars, which is about 2000 miles, or, according to the accurate obſervations of the moderns, only 1420 geographical miles. It is Salluſt who gives this account in his hiſtory of the Jugurthine war.

PHILANTHROPY is compounded of two Greek words which ſignify the love of mankind. It is therefore of nearly the ſame import with *benevolence* (A); and differs from *friendſhip*, as this latter affection ſubſiſts only between a few individuals, whilſt *philanthropy* comprehends the whole ſpecies.

Whether man has an inſtinctive propenſity to love his ſpecies, which makes him incapable of happineſs but in the midſt of ſociety, and impels him to do all the good that he can to others, feeling their felicity an addition to his own, is a queſtion that has been warmly debated among philoſophers ever ſince metaphyſics was ſtudied as a ſcience. With the opinions of the ancients we ſhall not, in this detached article, trouble our readers; but it would be unpardonable to paſs without notice the different theories which on ſo intereſting a ſubject have divided the moderns.

Hobbes, who believed, or pretended to believe, that right reſults from power, and that in ſociety there is no other ſtandard of juſtice than the law of the land, or the will of the ſupreme magiſtrate, built his opinions upon a theory of human nature in which philanthropy has no place. According to him, mankind, in the original ſtate of nature, were wholly *ſelfiſh*. Each endeavoured to ſeize, by fraud or force, whatever he thought would contribute to his comfort; and as all had nearly the ſame wants, the inevitable conſequence of this ſelfiſhneſs was univerſal war. We are taught indeed by the ſame philoſopher, that, in a ſeries of ages, mankind diſcovered the miſeries of this ſtate of nature; and therefore, upon the ſame baſis of univerſal ſelfiſhneſs, formed ſocieties, over which they placed ſupreme governors for the purpoſe of protecting the weak againſt the violence of the ſtrong. He does not, however, explain how men, whoſe angry and ſelfiſh paſſions were thus excited to the utmoſt againſt each other, could enter upon this friendly treaty; or, ſuppoſing it formed, how the ignorant multitude were induced to pay obedience to the more enlightened few. Clogged with this and other inſurmountable difficulties, his philoſophy of human nature ſoon fell into merited contempt; but about the *origin* of philanthropy thoſe who united in oppoſition to him ſtill thought very differently from one another.

The elegant Shafteſbury, who had imbibed much of the ſpirit of Plato, endeavoured, like his maſter, to deduce all the duties of man, and almoſt all his actions, from a number of internal feelings or inſtincts which he ſuppoſed to be interwoven with his conſtitution by the immediate hand of God. This ſyſtem appeared ſo honourable to human nature, and at the ſame time was ſo eaſily comprehended, that the noble lord had ſoon many followers, and may indeed be conſidered as the founder of a ſchool which has produced philoſophers whoſe works do honour to the age and country in which they flouriſhed. Among theſe we muſt reckon Biſhop Butler, Hutchiſon, Lord Kames, Dr Beattie, and perhaps Dr Reid.

According to the ſyſtem of theſe writers, the whole duty of man reſults from an intuitive principle, to which they have given the name of the moral ſenſe; and with this ſenſe they conceive philanthropy to be inſeparably united, or rather perhaps to make an eſſential part of it. (See MORAL PHILOSOPHY.). If this theory be carried to its utmoſt extent, as it has been by ſome of its patrons, it ſeems to follow, that peace and harmony ſhould reign among ſavages; and that a man who had from his infancy grown up in ſolitude, would be delighted with the firſt ſight of a fellow-creature, and run to him with eagerneſs as to a new ſource of enjoyment. This concluſion, however, is contrary to acknowledged facts. Savages are generally divided into ſmall tribes or hordes; and though the attachment of individuals to their own tribe appears indeed to be abundantly ſtrong, the tribes themſelves are frequently at war, and entertain a conſtant jealouſy of each other. Savages, too, are almoſt univerſally afraid of ſtrangers; and the few ſolitary individuals, who have been caught in parts where they had run wild from their infancy, inſtead of being delighted with the appearance of fellow-men, have either fled from them with their utmoſt ſpeed, or been fixed to the ſpot in terror and aſtoniſhment. Theſe are no indications of that inſtinctive philanthropy for which ſome writers ſo ſtrenuouſly plead. They have indeed induced others to deny, that in human nature there is any inſtinctive principles at all; and to endeavour to account for our ſeveral propenſities by the influence of education producing early and deep-rooted habits.

At the head of this ſchool ſtood Locke and Hartley. The former, employing himſelf almoſt wholly on the intellectual powers of man, and combating the abſurd, though then generally received, belief, that there are in the human mind innate principles of ſpeculative truth, has touched but incidentally on our principles of action. It ſeems, however, to be evident, that he did not conſider any *one* of theſe principles as innate; and his opinion was adopted by Hartley, who ſtudied the ſenſitive part of human nature with greater induſtry and ſucceſs than perhaps any writer who had preceded him in that department of ſcience. This philoſopher refuſes all kinds of inſtinct to man, even the ϛοργη of a mother to her new-born infant, and that which has been generally ſuppoſed innate—the propenſity of the infant to ſuck the breaſt. It is therefore needleſs to ſay that in his theory of human nature innate philanthropy can have no place.

The reader, however, muſt not ſuppoſe that the theory of Hartley is the theory of Hobbes. Though he admits no *innate* principles of action in the human mind, he is far from dreaming that the original ſtate of man was a ſtate of war and ſelfiſhneſs, or that the acquiſition of philanthropic ſentiments is not natural. He conſiders ſuch

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(A) We ſay *nearly* of the ſame import; becauſe *benevolence* extends to every being that has life and ſenſe, and is of courſe ſuſceptible of pain and pleaſure; whereas *philanthropy* cannot comprehend more than the human race.

ſuch acquiſitions as even neceſſary and unavoidable, and founds them on the great law of aſſociation, which we have elſewhere endeavoured to explain. (See METAPHYSICS, Part I. chap. v.). Hartley was a Chriſtian, and appears to have been a man of great piety. Conceiving with Locke that men are born without any ideas, or any principles either of knowledge or of action, but that they are indebted to the law of aſſociation as much as to the impreſſions of ſenſe, he ſeems to have thought, that the important purpoſe for which they are ſent into this world is, that they may acquire habits of piety and virtue, which, operating like inſtincts, will fit them for the purer ſociety of a future ſtate. That this theory is unfriendly to morals, no man who underſtands it will preſume to affirm. It appears, indeed, to be more conſiſtent with the neceſſity of a revelation from God than that of Shafteſbury, which has ſo many followers: but notwithſtanding this, we cannot help thinking that the excellent author has carried his antipathy to inſtincts by much too far (ſee INSTINCT), and that the truth lies in the middle between him and his opponents.

Without ſome inſtincts to influence before the dawn of reaſon, it is not eaſy to be conceived how children could be induced to that exerciſe which is abſolutely neceſſary to life and health; nor does it appear with ſufficient evidence that the human race are deſerted by every inſtinct as ſoon as their rational powers are evolved. It ſeems to be a matter of fact which cannot be controverted, that women have an inſtinctive attachment to their new-born infants; but that theſe, when they become capable of diſtinguiſhing objects, are *inſtinctively* attached to their parents, their brothers, and ſiſters, is a poſition which, though it may be true, ſeems incapable of proof. That they ſoon appear to be ſo attached, is a fact which we believe no man will deny: but the attachment may be accounted for by the aſſociating principle operating upon that deſire of happineſs which is neceſſarily formed as ſoon as happineſs is experienced. (See PASSION.). An infant becomes earlier attached to its nurſe than to any other perſon; becauſe, feeling wants which ſhe ſupplies, the idea of enjoyment becomes ſoon aſſociated in its mind with the perception of the woman. If this woman be its mother, a haſty obſerver immediately attributes this attachment to inſtinct directing the infant to love its parent: but that inſtinct has here no place, is evident from the well-known facts, that a child is as fond of a tender nurſe, though no relation, as of the moſt affectionate mother; and as regardleſs of a mother who ſeldom ſees it, or ſees it with indifference, as of any other perſon. Nay, we have ſeen children of the ſweeteſt diſpoſitions as fond of the maid with whom they ſlept, as of a very affectionate parent by whom they had been tenderly nurſed: and ſure no man will ſay that this could be inſtinct; it was evidently a new aſſociation of the idea of the maid with the greateſt happineſs which they enjoyed after the period of their ſuckling was at an end.

It is much in the ſame way that children acquire an attachment to their brothers and ſiſters. Brothers and ſiſters being conſtantly together, contribute to each other's amuſement: hence ariſes that pleaſure which they have in each other's company, and the uneaſineſs which they feel when ſeparated. This generates mutual love in their minds, which is ſtrengthened by the perpetual injunctions of their parents; for if theſe have any virtue themſelves, they cannot fail to inculcate the duty of loving each other on their tender offspring. Benevolence, thus generated, ſoon extends to their daily companions; and takes a wider and a wider range as their companions are multiplied, and as children advance towards the ſtate of manhood. New objects then preſent themſelves to the mind. A man ſoon diſcovers, that, as he is a member of a community, his happineſs as an individual depends in a great meaſure on the proſperity of the whole. Hence ariſes *patriotiſm*, and that pleaſure which we all take in the eminence of our countrymen. But the principle of benevolence ſtops not here. He whoſe mind is enlarged by a liberal education, conſiders all particular countries as provinces of one great country extended over the whole globe; and all mankind, of courſe, as not only ſharing the ſame nature with himſelf, but as being in reality his fellow-citizens and brethren. The principles of religion, if he be actuated by them, muſt aid theſe reflexions, and make him wiſh the happineſs of all who ſtand in the ſame relation with himſelf to the Great Governor of the world. This is *philanthropy*; and we ſee how it may ſpring, by the great law of aſſociation, from deſires which, in their original ſtate, cannot be conſidered as other than ſelfiſh. It is a calm ſentiment, which we believe hardly ever riſes to the warmth of affection, and certainly not to the heat of paſſion.

Should any of our readers be diſpoſed to controvert this opinion, or to fancy it degrading to human nature, we will not enter into controverſy with them; we only beg leave to aſk, whether they have ever rejoiced in the good fortune of a ſtranger or a foreigner, or regretted his loſs, with any portion of thoſe feelings which they have frequently experienced on hearing of the proſperity or the death of a friend or a neighbour? We anſwer candidly for ourſelves, that we feel no intereſt which can be called *paſſion* or *affection* in the fortunes of a native of China; and yet we ſhould be ſorry to think that our philanthropy is leſs than that of other men. A common clown, we are inclined to believe, ſeldom extends his affection beyond his friends and neighbours; and though, from having often heard his country praiſed, and knowing that he belongs to his country, he would probably be offended at the man who ſhould prefer another to it; yet if no misfortune befal himſelf, or his friends and neighbours, we imagine that his grief for public calamities may be borne with patience. In his mind no ſuch aſſociations have been formed as compriſe the good of a country, far leſs of all countries; and therefore his philanthropy muſt be confined to a very limited range. We doubt not, however, but that as opportunity offers, and as circumſtances permit, ſuch a man is ready to feed the hungry and clothe the naked of all countries; not indeed from ſentiments of affection either innate or acquired, but from the obvious reflection that he is not exempted from thoſe calamities which have befallen them, and from a ſtill higher principle—a ſenſe of duty to that God who has made of one blood all nations upon earth, and commanded them to be mutually aiding to each other.

PHILEMON, a Greek comic poet, was ſon to Damon, and cotemporary with Menander. Any advantage he had over this poet, was owing leſs to his own merit than to the intrigues of his friends. Plautus has imitated his comedy *du Marchand*. He is reported to have died laughing on ſeeing his aſs eat figs. He was then

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about 97 years of age. His ſon Philemon the younger, was alſo the author of 54 comedies, of which there are ſtill extant ſome conſiderable fragments collected by Grotius. Theſe clearly prove that he was not a poet of the firſt rank. He flouriſhed about the year 274 before our Saviour.

Philemon, was a rich citizen of Coloſſæ in Phrygia. He was converted to the Chriſtian faith, with Appia his wife, by Epaphras the diſciple of St Paul; for St Paul himſelf did not preach at Coloſſæ, Coloſſ. ii. 1. Perhaps we ſhould have known nothing of St Philemon, had it not been on the account of his ſlave Oneſimus, who having robbed him, and run away from him, came to Rome, where he found St Paul, and was very ſerviceable to him. St Paul converted him, baptized him, and ſent him back to his maſter Philemon; to whom he wrote a letter ſtill extant, and which paſſes for a maſterpiece of that kind of eloquence, natural, lively, ſtrong, and pathetic, that was peculiar to St Paul. Philemon (1. 2.) had made a church of his houſe, and all his domeſtics, as well as himſelf, were of the houſehold of faith. His charity, liberality, and compaſſion, were a ſure refuge to all that were in diſtreſs. The Apoſtolical Conſtitutions ſay, that St Paul made him biſhop of Coloſſæ; but the Menæa inſinuate, that he went to Gaza in Paleſtine, of which he was the apoſtle and firſt biſhop. From hence he returned to Coloſſæ, where he ſuffered martyrdom with Appia his wife, in the time of Nero. They relate ſeveral particulars of his martyrdom, and ſay, that his body remained at Coloſſæ, where it performed ſeveral miracles.

PHILETAS, a Greek poet and grammarian, of the iſland of Cos, flouriſhed under Philip and Alexander the Great, and was preceptor of Ptolemy Philadelphus. He was the author of ſome Elegies, Epigrams, and other works, which have not come down to us. He is celebrated in the poems of Ovid and Propertius, as one of the beſt poets of his age. Elian reports a very improbable ſtory of him, namely, "that his body was ſo ſlender and feeble, that he was obliged to have ſome lead in his pockets, to prevent him from being carried away by the wind."

PHILETUS. St Paul, writing to Timothy (2 Tim. ii. 16, 17, 18.) in the 65th year of Chriſt, and a little while before his own martyrdom, ſpeaks thus: "But ſhun profane and vain babblings, for they will increaſe unto more ungodlineſs. And their word will eat as doth a canker; of whom is Hymenæus and Philetus; who concerning the truth have erred, ſaying, that the reſurrection is paſt already, and overthrow the faith of ſome." We have nothing very certain concerning Philetus; for we make but ſmall account of what is read in the falſe Abdias, in the life of St James major, even ſuppoſing this author had not put the name of Philetus inſtead of Phygellus. This is the ſubſtance of what is found in Abdias. St James the ſon of Zebedee, paſſing through the ſynagogues of Judea and Samaria, preached everywhere the faith of Jeſus Chriſt. Hermogenes and Philetus ſtrenuouſly oppoſed him, affirming, that Jeſus Chriſt was not the Meſſiah. Hermogenes was a notable magician, and Philetus was his diſciple, who being converted, was deſirous to bring his maſter to St James; but Hermogenes bound him up ſo by his magic art, that he could not come at the apoſtle. Philetus found means to make St James acquainted with what had happened to him; upon which St James unbound him, and Philetus came to him. Hermogenes perceiving how ineffectual his art was againſt the ſaint, became himſelf a convert as well as Philetus.

PHILIBEG, is a little plaid, called alſo *kilt*, and is a ſort of ſhort petticoat reaching nearly to the knees, worn by the Scotch Highlanders. It is a modern ſubſtitute for the lower part of the plaid, being found to be leſs cumberſome, eſpecially in time of action, when the Highlanders uſed to tuck their brechdan into their girdle. Almoſt all of them have a great pouch of badger and other ſkins, with taſſels dangling before, in which they keep their tobacco and money.

PHILIP, foſter-brother of Antiochus Epiphanes (1 Macc. vi. 14, & 55. 2 Macc. ix. 29.), was a Phrygian by birth, and very much in Antiochus's favour. This prince made him governor of Jeruſalem (2 Macc. viii. 8. v. 22.) where he committed many outrages upon the Jews, to force them to forſake their religion. Seeing that Apollonius and Seron were defeated by Judas Maccabæus, he ſent for new ſuccours to Ptolemy governor of Cœlo-Syria, who ſent him Gorgias and Nicanor with a powerful army. Some time after, Antiochus going beyond the Euphrates, to extort money from the people, Philip went along with him; and Antiochus finding himſelf near his end (1 Macc. vi. 14.) made him regent of the kingdom, put his diadem into his hands, his royal cloak, and his ring, that he might render them to his ſon the young Antiochus Eupator. But Lyſias having taken poſſeſſion of the government in the name of young Eupator, who was but a child, Philip not being able to cope with him, durſt not return into Syria: but he went into Egypt, carrying the body of Epiphanes along with him, there to implore aſſiſtance from Ptolemy Philometor againſt Lyſias the uſurper of the government of Syria. The year following, while Lyſias was buſy in the war carrying on againſt the Jews, Philip got into Syria, and took poſſeſſion of Antioch: but Lyſias returning into the country, with great diligence, retook Antioch, and put Philip to death, who was taken in the city.

Philip the apoſtle was a native of Bethſaida in Galilee. Jeſus Chriſt having ſeen him, ſaid to him, "Follow me," John i. 43, 44, &c. Philip followed him; and ſoon after finding Nathanael, Philip ſaid to him, "We have found the Meſſiah, of whom Moſes and the prophets have ſpoken, Jeſus of Nazareth, the ſon of Joſeph." Nathanael aſked him, "Can any thing good come out of Nazareth? To which Philip replied, "Come and ſee." Then he brought Nathanael to Jeſus, and they went with him to the marriage of Cana in Galilee. St Philip was called at the very beginning of our Saviour's miſſion; and when Jeſus Chriſt was about to feed the 5000 that followed him (Luke vi. 13. Mat. x. 2. John vi. 5—7.), he aſked St Philip, only to prove him, whence bread might be bought for ſuch a multitude of people? Philip anſwered, that 200 penny-worth of bread would not be ſufficient for every one to taſte a little. Some Gentiles, having a curioſity to ſee Jeſus Chriſt, a little before his paſſion, they addreſſed themſelves to St Philip (John xii. 21, 22.), who mentioned it to St Andrew, and theſe two to Chriſt. At the laſt ſupper, Philip deſired our Saviour, that he would be pleaſed to ſhow them the Father, being all that they deſired (John xiv. 8—10.) But Jeſus told them, that ſeeing the Son they ſaw the Father

Philip.

Father alſo. This is all we find concerning Philip in the goſpel.

The upper Aſia fell to this apoſtle's lot, where he took great pains in planting the goſpel, and by his preaching and miracles made many converts. In the latter part of his life, he came to Hierapolis in Phrygia, a city very much addicted to idolatry, and particularly to the worſhip of a ſerpent of a prodigious bigneſs. St Philip by his prayers procured the death, or at leaſt the diſappearing, of this monſter, and convinced its worſhippers of the abſurdity of paying divine honours to ſuch odious creatures. But the magiſtrates, enraged at Philip's ſucceſs, impriſoned him, and ordered him to be ſeverely ſcourged, and then put to death, which ſome ſay was by crucifixion; others, by hanging him up againſt a pillar. St Philip is generally reckoned among the married apoſtles; and it is ſaid he had three daughters, two whereof preſerved their virginity, and died at Hierapolis; the third, having led a very ſpiritual life, died at Ehpeſus. He left behind him no writings. The goſpel under his name was forged by the Gnoſtics, to countenance their bad principles and worſe practices. The Chriſtian church obſerves the feſtival of this ſaint, together with that of St James, on the firſt day of May. Euſeb. lib. iii. c. 30.

Philip, the ſecond of the ſeven deacons, was choſen by the apoſtles after our Saviour's reſurrection. (Acts vi. 5.). This deacon, they ſay, was of Cæſarea in Paleſtine. It is certain that his daughters lived in this city (Acts xxi. 8, 9.). After the death of St Stephen, all the Chriſtians, excepting the apoſtles, having left Jeruſalem, and being diſperſed in ſeveral places, St Philip went to preach at Samaria (*id.* viii. 1, 2, &c.), where he performed ſeveral miracles, and converted many perſons. He baptized them; but being only a deacon, he could not confer on them the Holy Ghoſt. Wherefore having made known to the apoſtles at Jeruſalem, that Samaria had received the word of God, Peter and John came thither, and the Samaritans that were converted received the Holy Ghoſt. St Philip was probably at Samaria when the angel of the Lord ordered him to go to the ſouth part of the country, in the road that leads from Jeruſalem to old Gaza. Philip obeyed, and there met with an Ethiopian eunuch belonging to Queen Candace, who had the care of her revenues, and had been at Jeruſalem to worſhip God there (*id.* viii. 26, 27, &c.). He was then returning into his own country, and was reading the prophet Iſaiah as he went along in his chariot. Philip, hearing the eunuch reading the prophet Iſaiah, ſaid to him, Do you underſtand what you read? The eunuch replied, How ſhould I underſtand, except ſomebody explain it to me? He deſired Philip therefore to come and ſit down by him in the chariot. The paſſage the eunuch was reading is this: "He was led as a ſheep to the ſlaughter, and like a lamb dumb before his ſhearer, ſo he opened not his mouth." The eunuch then ſays to Philip, Pray, whom does the prophet ſpeak of in this place? Is it of himſelf, or of ſome other? Then Philip began to inſtruct him concerning Jeſus Chriſt. And having gone on together, they came to a fountain; when the eunuch ſaid to Philip, Here is water, what hinders me from being baptized? Philip told him that he might be ſo, if he believed with all his heart. He replied, I believe that Jeſus Chriſt is the ſon of God. He then ordered the chariot to ſtop, and they both alighted and went down into the water, where Philip baptized the eunuch. Being come out of the water, the Spirit of the Lord took away Philip, and the eunuch ſaw no more of him. But Philip was found again at Azotus, and he preached the goſpel in all the cities he paſſed through, till he arrived at Cæſarea in Paleſtine. After this, the ſcripture does not inform us of any particulars relating to Philip. The modern Greeks ſay that he went to Tralles in Aſia, where he founded a church, of which he was the apoſtle and biſhop; and where he reſted in peace, after performing many miracles. The Latins, on the contrary, ſay that he died at Cæſarea, and that three of his daughters were there buried with him.

Philip.

It is thought, that the eunuch converted by St Philip was the firſt apoſtle of the Ethiopians; and that the Abyſſines boaſt of having received the Chriſtian faith from him.

Lempriere's Bibliotheca Claſſica.

Philip II. was the fourth ſon of Amyntas, King of Macedonia. He was ſent to Thebes as an hoſtage by his father, where he learnt the art of war under Epaminondas, and ſtudied with the greateſt care the manners and the purſuits of the Greeks. He diſcovered, from his earlieſt years, that quickneſs of genius and greatneſs of courage which afterwards procured him ſo great a name and ſuch powerful enemies. He was recalled to Macedonia; and at the death of his brother Perdiccas he aſcended the throne as guardian and protector of the youthful years of his nephew. His ambition, however, ſoon diſcovered itſelf, and he made himſelf independent about the year 360 before Chriſt. The valour of a prudent general, and the policy of an experienced ſtateſman, ſeemed requiſite to enſure his power. The neighbouring nations, ridiculing the youth and inexperience of the new king of Macedonia, appeared in arms: but Philip ſoon convinced them of their error. Unable to meet them as yet in the field of battle, he ſuſpended their fury by preſents, and ſoon turned his arms againſt Amphipolis, a colony tributary to the Athenians. Amphipolis was conquered, and added to the kingdom of Macedonia; and Philip meditated no leſs than the deſtruction of a republic which had rendered itſelf ſo formidable to the reſt of Greece, and had even claimed ſubmiſſion from the princes of Macedonia. His deſigns, however, were as yet immature; and before he could make Athens an object of conqueſt, the Thracians and the Illyrians demanded his attention. He made himſelf maſter of a Thracian colony, to which he gave the name of *Philippi*, and from which he received the greateſt advantages on account of the gold mines in the neighbourhood. Theſe made it a very important capture. He ſettled in it a number of workmen, and was the firſt who cauſed gold to be coined in his own name. He employed his wealth in procuring ſpies and partiſans in all the great cities of Greece, and in making conqueſts without the aid of arms. It was at the ſiege of Methone in Thrace that Philip had the misfortune to receive a wound in his right eye from the ſtroke of an arrow. In the midſt of his political proſperity, Philip did not neglect the honour of his family. He married Olympias the daughter of Neoptolemas, king of the Moloſſi; and when, ſome time after, he became father of Alexander, the monarch, conſcious of the ineſtimable advantages which ariſe from the leſſons, the example, and converſation of a learned and virtuous preceptor, wrote a letter with his own hand to the philoſopher Ariſtotle, and begged him to retire from his uſual purſuits, and to dedicate his whole time to the inſtruction of the young prince. Every thing ſeemed now to conſpire to his aggrandizement; and hiſtorians have obſerved that Philip received in one day the intelligence of three things which could gratify the moſt unbounded ambition, and flatter the hopes of the moſt aſpiring monarch: the birth of a ſon, an honourable crown at the Olympic games, and a victory over the barbarians of Illyricum. But all theſe rather increaſed than ſatiated his ambition: he declared his inimical ſentiments againſt the power of Athens, and the independance of all Greece, by laying ſiege to Olynthus, a place which, on account of its ſituation and conſequence, would prove moſt injurious to the intereſts of the Athenians, and moſt advantageous to the intrigues and military operations of every Macedonian prince. The Athenians rouſed by the eloquence of Demoſthenes, ſent 17 veſſels and 2000 men to the aſſiſtance of Olynthus; but the money of Philip prevailed over all their efforts. The greateſt part of the citizens ſuffered themſelves to be bribed by the Macedonian gold, and Olynthus ſurrendered to the enemy, and was inſtantly reduced to ruins. Philip ſoon after defeated the Athenians, and made a great number of them priſoners, whom he diſmiſſed without ranſom. Of this victory, the fruit of that excellent diſcipline which he had eſtabliſhed in his army, the Macedonian phalanx had the principal honour. This was a body of infantry heavily armed, conſiſting commonly of 16,000 men, who had each of them a ſhield ſix feet high and a pike 21 feet long. (See PHALANX). The ſucceſs of his arms, and eſpecially his generoſity after victory, made his alliance and a peace a deſirable object to the people of Athens; and as both parties were inclined to this meaſure, it was concluded without delay. His ſucceſſes were as great in every part of Greece: he was declared head of the Amphictyonic council, and was entruſted with the care of the ſacred temple of Apollo at Delphi. If he was recalled to Macedonia, it was only to add freſh laurels to his crown, by victories over his enemies in Illyricum and Theſſaly. By aſſuming the maſk of a moderator and peace-maker, he gained confidence; and in attempting to protect the Peloponneſians againſt the incroaching power of Sparta, he rendered his cauſe popular; and by ridiculing the inſults that were offered to his perſon as he paſſed through Corinth, he diſplayed to the world his moderation and philoſophic virtues. In his attempts to make himſelf maſter of Eubœa, Philip was unſucceſsful; and Phocion, who deſpiſed his gold as well as his meanneſs, obliged him to evacuate an iſland whoſe inhabitants were as inſenſible to the charms of money as they were unmoved at the horrors of war, and the bold efforts of a vigilant enemy. From Eubœa he turned his arms againſt the Scythians; but the advantages he obtained over this indigent nation were inconſiderable, and he again made Greece an object of plunder and rapine. He advanced far in Bœotia, and a general engagement was fought at Chæronea. The fight was long and bloody, but Philip obtained the victory. His behaviour after the battle reflects great diſgrace upon him as a man and as a monarch. In the hour of feſtivity, and during the entertainment which he had given to celebrate the trophies he had won, Philip ſallied from his camp, and with the inhumanity of a brute, he inſulted the bodies of the ſlain, and exulted over the calamities of the priſoners of war. His inſolence, however, was checked, when Demades, one of the Athenian captives, reminded him of his meanneſs, by exclaiming, "Why do you, O king, act the part of a Therſites, when you can repreſent with ſo much dignity the elevated character of an Agamemnon?" The reproof was felt; Demades received his liberty; and Philip learned how to gain popularity even among his fallen enemies; by relieving their wants and eaſing their diſtreſſes. At the battle of Chæronea the independence of Greece was extinguiſhed; and Philip, unable to find new enemies in Europe, formed new enterpriſes, and meditated new conqueſts. He was nominated general of the Greeks againſt the Perſians, and was called upon as well from inclination as duty to revenge thoſe injuries which Greece had ſuffered from the invaſions of Darius and of Xerxes. But he was ſtopped in the midſt of his warlike preparations, being ſtabbed by Pauſanias as he entered the theatre at the celebration of the nuptials of his daughter Cleopatra. This murder has given riſe to many reflections upon the cauſes which produced it; and many who conſider the recent repudiation of Olympias and the reſentment of Alexander, are apt to inveſtigate the cauſes of his death in the boſom of his family. The ridiculous honours which Olympias paid to her huſband's murderer ſtrengthened the ſuſpicion; yet Alexander declared that he invaded the kingdom of Perſia to revenge his father's death upon the Perſian ſatraps and princes, by whoſe immediate intrigues the aſſaſſination had been committed. The character of Philip is that of a ſagacious, artful, prudent, and intriguing monarch: he was brave in the field of battle, eloquent and diſſimulating at home, and he poſſeſſed the wonderful art of changing his conduct according to the diſpoſition and caprice of mankind, without ever altering his purpoſe, or loſing ſight of his ambitious aims. He poſſeſſed much perſeverance, and in the execution of his plans he was always vigorous. He had that eloquence which is inſpired by ſtrong paſſions. The hand of an aſſaſſin prevented him from atchieving the boldeſt and the moſt extenſive of his undertakings; and he might have acquired as many laurels, and conquered as many nations, as his ſon Alexander did in the ſucceeding reign; and the kingdom of Perſia might have been added to the Macedonian empire, perhaps with greater moderation, with more glory, and with more laſting advantages. The private character of Philip lies open to cenſure, and raiſes indignation. The admirer of his virtues is diſguſted to find him among the moſt abandoned proſtitutes, and diſgracing himſelf by the moſt unnatural crimes and laſcivious indulgencies which can make even the moſt debauched and the moſt profligate to bluſh. He was murdered in the 47th year of his age, and the 24th of his reign, about 336 years before the Chriſtian era. His reign is become uncommonly intereſting, and his adminiſtration a matter of inſtruction. He is the firſt monarch whoſe life and actions are deſcribed with peculiar accuracy and hiſtorical faithfulneſs. Philip was the father of Alexander the Great and of Cleopatra, by Olympias; he had alſo by Audaca an Illyrian, Cyna, who married Amyntas the ſon of Perdiccas, Philip's elder brother; by Nicaſipolis a Theſſalian, Nicæa, who married Caſſander; by Philæna a

Philip.

Lariſſæan dancer, Aridæus, who reigned ſome time after Alexander's death; by Cleopatra, the niece of Attalus, Caranus and Europa, who were both murdered by Olympias; and Ptolemy the firſt king of Egypt, by Arſinoe, who in the firſt month of her pregnancy was married to Lagus. Of the many memorable actions and ſayings reported by Plutarch of this prince, the following are the moſt remarkable. Being preſent at the ſale of ſome captives, in an indecent poſture, one of them informed him of it; “Set this man at liberty (ſays Philip), I did not know that he was my friend.” Being ſolicited to favour a lord of his court, who was like to loſe his character by a juſt but ſevere ſentence, Philip refuſed to hearken to the ſolicitation, and added, “I had rather that he be diſgraced than myſelf.” A poor woman was importuning him to do her juſtice; and as he ſent her away from day to day, under the pretence that he had no time to attend to her petition, ſhe ſaid to him with ſome warmth, “Ceaſe then to be a king.” Philip felt all the force of this reproof, and immediately gave her ſatisfaction.—Another woman came to aſk juſtice of him as he was going out from a great entertainment, and was condemned. “I appeal (exclaimed ſhe)!” “And to whom do you appeal (ſaid the king to her)?” “To Philip faſting.” This anſwer opened the eyes of the monarch, who retracted his ſentence. If he poſſeſſed any virtue, it was principally that of ſuffering injuries with patience. Demochares, to whom the Greeks gave the ſurname of *Parrheſiaſtes*, on account of his exceſſive petulance of tongue, was one of the deputies whom the Athenians ſent to this monarch. Philip, at the concluſion of the audience, begged the ambaſſadors to tell him, “if he could be of any ſervice to the Athenians;” to which Democharus gave an inſolent return, which he forgave. Having learned that ſome Athenian ambaſſadors charged him, in full aſſembly, with atrocious calumnies: “I am under great obligations (ſaid he) to thoſe gentlemen, for I ſhall henceforwards be ſo circumſpect in my words and actions, that I ſhall convict them of falſehood.” One ſaying of Philip, which does him leſs honour than thoſe we have before-mentioned, was, “Let us amuſe children with playthings, and men with oaths.” This abominable maxim, which was the ſoul and ſpring of his politics, gave riſe to the obſervation, “That he was in full length, what Louis XI. afterwards was in miniature.” It is well known that Philip had a perſon about him, who called out at times, “Philip, remember that thou art mortal;” but whether we ſhould place this to the account of his pride or his humility, it is difficult to ſay.

bid.

Philip V. was king of Macedonia, and ſon of Demetrius. His infancy, at the death of his father, was protected by Antigonus, one of his friends, who aſcended the throne, and reigned for 12 years, with the title of *Independent monarch*. When Antigonus died, Philip recovered his father's throne, though only 15 years of age, and he early diſtinguiſhed himſelf by his boldneſs and his ambitious views. He came to the throne in the year 220 before our Saviour, and the beginning of his reign was rendered glorious by the conqueſts of Aratus; a general who was as eminent for his love of juſtice as his ſkill in war. But ſo virtuous a character could hardly fail to be diſagreeable to a prince who wanted to indulge himſelf in every ſpecies of diſſipation and vice: and indeed his cruelty to him ſoon diſplayed his character in its true light; for to the gratification of every vice, and every extravagant propenſity, he had the meanneſs to ſacrifice this faithful and virtuous Athenian. Not ſatisfied with the kingdom of Macedonia, Philip aſpired to become the friend of Hannibal, and wiſhed to ſhare with him the ſpoils which the diſtreſſes and continual loſs of the Romans ſeemed ſoon to promiſe. But his expectations were fruſtrated; the Romans diſcovered his intrigues; and though weakened by the valour and artifice of the Carthaginian, yet they were ſoon enabled to meet him in the field of battle. The conſul Lævinus entered without delay his territories of Macedonia; and after he had obtained a victory over him near Apollonia, and reduced his fleet to aſhes, he compelled him to ſue for peace. This peaceful diſpoſition was not permanent; and when the Romans diſcovered that he had aſſiſted their formidable enemy Hannibal with men and money, they appointed T. Q. Flaminius to puniſh his perfidy, and the violation of the treaty. The Roman conſul, with his uſual expedition, invaded Macedonia; and in a general engagement, which was fought near Cynocephale, the hoſtile army was totally defeated, and the monarch ſaved his life with difficulty by flying from the field of battle. Deſtitute of reſources, without friends either at home or abroad, Philip was obliged to ſubmit to the mercy of the conqueror, and to demand peace by his ambaſſadors. It was granted with difficulty; the terms were humiliating; but the poverty of Philip obliged him to accept the conditions, however diſavantageous and degrading to his dignity. In the midſt of theſe public calamities, the peace of his family was diſturbed; and Perſes, the eldeſt of his ſons by a concubine, raiſed ſeditions againſt his brother Demetrius, whoſe condeſcenſion and humanity had gained popularity among the Macedonians, and who from his reſidence at Rome, as an hoſtage, had gained the good graces of the ſenate, and by the modeſty and innocence of his manners had obtained forgiveneſs from that venerable body for the hoſtilities of his father. Philip liſtened with too much avidity to the falſe accuſations of Perſes; and when he heard it aſſerted that Demetrius wiſhed to rob him of his crown, he no longer heſitated to puniſh with death ſo unworthy and ſo ungrateful a ſon. No ſooner was Demetrius ſacrificed to credulity, than Philip became convinced of his cruelty and raſhneſs; and to puniſh the perfidy of Perſes, he attempted to make Antigonus, another ſon, his ſucceſſor on the Macedonian throne. But he was prevented from executing his purpoſe by death, in the 42d year of his reign, 178 years before the Chriſtian era. The aſſaſſin of Demetrius ſucceeded his father, and with the ſame ambition, with the ſame raſhneſs and oppreſſion, renewed the war againſt the Romans, till his empire was deſtroyed, and Macedonia became a Roman province. Philip has been compared with his great anceſtor of the ſame name; but though they poſſeſſed the ſame virtues, the ſame ambition, and were tainted with the ſame vices, yet the father of Alexander was more ſagacious and more intriguing, and the ſon of Demetrius was more ſuſpicious, more cruel, and more implacable; and, according to the pretended prophecy of one of the Sybils, Macedonia was indebted to one Philip for her

Philip

the real conſequence among nations, and under another Philip ſhe lamented the loſs of her power, her empire, and her dignity.

PHILIP, *M. Julius*, a Roman emperor, of an obſcure family in Arabia, from whence he was ſurnamed *Arabian*. From the loweſt rank in the army he gradually roſe to the higheſt offices; and when he was made general of the prætorian guards, he aſſaſſinated Gordian, to make himſelf emperor. To ſecure himſelf on the imperial throne, he left Meſopotamia a prey to the continual invaſions of the Perſians, and hurried to Rome, where his election was univerſally approved by the ſenate and the Roman people. Philip rendered his cauſe popular by his liberality and profuſion; and it added much to his ſplendour and dignity, that the Romans during his reign commemorated the foundation of their city; a ſolemnity which was obſerved but once every 100 years, and which was celebrated with more pomp and more magnificence than under the preceding reigns. The people were entertained with games and ſpectacles; the theatre of Pompey was ſucceſſively crowded during three days and three nights; and 2000 gladiators bled in the circus at once, for the amuſement and pleaſure of a gazing populace. His uſurpation, however, was ſhort. Philip was defeated by Decius, who had proclaimed himſelf emperor in Pannonia; and he was aſſaſſinated by his own ſoldiers near Verona, in the 45th year of his age, and the 5th of his reign. His ſon, who bore the ſame name, and who had ſhared with him the imperial dignity, was alſo maſſacred in the arms of his mother. Young Philip was then in the 12th year of his age, and the Romans lamented in him the loſs of riſing talents, of natural humanity, and endearing virtues.

Ibid. PHILIP, a native of Acarnania, phyſician to Alexander the Great. When that monarch had been ſuddenly taken ill, after bathing in the Cydnus, Philip undertook to remove the complaint, when the reſt of the phyſicians believed that all medical aſſiſtance would be ineffectual. But as he was preparing his medicine, Alexander received a letter from Parmenio, in which he was adviſed to beware of his phyſician Philip, as he had conſpired againſt his life. The monarch was alarmed; and when Philip preſented him the medicine, he gave him Parmenio's letter to peruſe, and began to drink the potion. The ſerenity and compoſure of Philip's countenance, as he read the letter, removed every ſuſpicion from Alexander's breaſt, and he purſued the directions of his phyſician, and in a few days recovered.

There were, beſides, a vaſt number of perſons of this name in antiquity, and many of them were very eminent.

PHILIP I. king of France, ſucceeded his father Henry I. in 1060, when but eight years of age, under the regency and guardianſhip of Baudouin V. count of Flanders, who diſcharged his truſt with zeal and fidelity. He defeated the Gaſcons who were inclined to revolt, and died, leaving his pupil 15 years of age. This young prince made war in Flanders againſt Robert, Baudouin's younger ſon, who had invaded Flanders, which belonged to the children of his elder brother. Philip marched againſt him with a numerous army, which was cut to pieces near Mount Caſſel. Peace was the conſequence of the victory, and the conqueror quietly enjoyed his uſurpation. Philip, after the fatigues of the war, by way of relaxation gave himſelf up entirely to pleaſure and diſſipation. Tired of his wife Bertha, and fond of Bertrade, ſpouſe of Foulques count of Anjou, he carried her off from her huſband. Having, in 1093, legally annulled his own marriage, under the pretext of barrenneſs, and Bertrade's marriage with the count of Anjou having been ſet aſide under the ſame pretext, Philip and ſhe were afterwards ſolemnly married by the biſhop of Beauvais. This union was declared void by Pope Urban II. a Frenchman by birth, who pronounced the ſentence in the king's own dominions, to which he had come for an aſylum. Philip, fearing that the anathemas of the Roman pontiff might be the means of exciting his ſubjects to rebellion, ſent deputies to the pope, who obtained a delay, during which time he was permitted to uſe the crown. To know what is meant by this permiſſion, it is neceſſary to recollect, that at that period kings appeared on public ſolemnities in royal habit, with the crown on their heads, which they received from the hand of a biſhop. This delay was not of long duration. Philip was excommunicated anew in a council held at Poictiers in 1100; but in the year 1104, Lambert biſhop of Arras, legate of Pope Paſcal II. at laſt brought him his abſolution to Paris, after having made him promiſe never to ſee Bertrade more; a promiſe which he did not keep. It would appear that the pope afterwards approved their marriage; for Suger informs us, that their ſons were declared capable of ſucceeding to the crown. Philip died at Melun the 29th of July 1108, aged 57 years, after having witneſſed the firſt cruſade, in which he declined taking any part. His reign, which comprehends a period of 48 years, was the longeſt of any of his predeceſſors, excepting that of Clotarius, and of all who came after him except thoſe of Louis XIV. and Louis XV. It was diſtinguiſhed by ſeveral great events: but Philip, though brave in battle, and wiſe in counſels, was no very excellent character. He appeared ſo much the more contemptible to his ſubjects, as that age abounded with heroes. Philip is not the firſt of the French monarchs (as is commonly reported), who, in order to give the greater authority to his charters, cauſed them to be ſubſcribed by the officers of the crown; for Henry I. had ſometimes done the ſame before him.

Philip.

PHILIP II. ſurnamed *Auguſtus*, the *conqueror and given of God*, ſon of Louis VII. (called the *younger*), king of France, and of Alix, his third wife, daughter of Thibault, count of Champagne, was born the 22d of Auguſt 1165. He came to the crown, after his father's death in 1180, at the age of 15 years. His youth was not ſpent like that of the generality of other princes; for, by avoiding the rock of pleaſure on which ſo many are apt to ſplit, his courage thereby became the more lively and intrepid. The king of England ſeemed willing to take advantage of his minority, and to ſeize upon a part of his dominions. But Philip marched againſt him, and compelled him, ſword in band, to confirm the ancient treaties between the two kingdoms. As ſoon as the war was ended, he made his people enjoy the bleſſings of peace. He gave a check to the oppreſſions of the great lords, baniſhed the comedians, puniſhed blaſphemies, cauſed the ſtreets and public places of Paris to be paved, and annexed to that capital a part of the adjacent villages. It was encloſed by walls with towers;

and the inhabitants of other cities were equally proud to fortify and embelliſh theirs. The Jews having for a long time practiſed the moſt ſhameful frauds in France, Philip expelled them from his kingdom, and declared his ſubjects quit with them; an action unjuſt, contrary to the laws of nature, and conſequently to religion. The tranquillity of France was ſomewhat diſturbed by a difference with the count of Flanders, which was however happily terminated in 1184. Some time after he declared war againſt Henry II. king of England, and took from him the towns of Iſſoudun, Tours, Mans and other places. The epidemical madneſs of the cruſades then agitated all Europe; and Philip, as well as other princes, caught the infection. He embarked in the year 1190, with Richard I. king of England, for the relief of the Chriſtians in Paleſtine, who were oppreſſed by Saladin. Theſe two monarchs ſat down before Acre, which is the ancient Ptolemais; as did almoſt all the Chriſtians of the eaſt, while Saladin was engaged in a civil war on the banks of the Euphrates. When the two European monarchs had joined their forces to thoſe of the Aſiatic Chriſtians, they counted above 300,000 fighting men. Acre ſurrendered the 13th of July 1191; but the unhappy diſagreement which took place between Philip and Richard, rivals of glory and of intereſt, did more miſchief than could be compenſated by the ſucceſsful exertions of thoſe 300,000 men. Philip, tired of theſe diviſions, and diſpleaſed with the behaviour of Richard his vaſſal, returned to his own country, which, perhaps, he ſhould never have left, or at leaſt have ſeen again with more glory. Beſides, he was attacked (ſay hiſtorians) with a languiſhing diſorder, the effects of which were attributed to poiſon; but which might have been occaſioned merely by the ſcorching heat of a climate ſo different from that of France. He loſt his hair, his beard, and his nails; nay, his very fleſh came off. The phyſicians urged him to return home; and he ſoon determined to follow their advice. The year after, he obliged Baudouin VIII. count of Flanders to leave him the county of Artois. He next turned his arms againſt Richard king of England, from whom he took Evreux and Vexin; though he had promiſed upon the holy goſpels never to take any advantage of his rival during his abſence; ſo that the conſequences of this war were very unfortunate. The French monarch, repulſed from Rouen with loſs, made a truce for ſix months; during which time he married Ingelburge, princeſs of Denmark, whoſe beauty could only be equalled by her virtue. The divorcing of this lady, whom he quitted in order to marry Agnes daughter of the duke of Merania, embroiled him with the court of Rome. The pope iſſued a ſentence of excommunication againſt him; but it was taken off upon his promiſing to take back his former wife. John Sans-terre ſucceeded to the crown of England in 1199, to the prejudice of his nephew Arthur, to whom of right it belonged. The nephew, ſupported by Philip, took up arms againſt the uncle, but was defeated in Poictou, where he was taken priſoner, and afterwards murdered. The murderer being ſummoned before the court of the peers of France, not having appeared, was declared guilty of his nephew's death, and condemned to loſe his life in 1203. His lands, ſituated in France, were forfeited to the crown. Philip ſoon ſet about gathering the fruit of his vaſſal's crime. He ſeized upon Normandy, then carried his victorious arms into Maine, Anjou, Touraine, Poictou, and brought theſe provinces, as they anciently were, under the immediate authority of his crown. The Engliſh had no other part left them in France but the province of Guienne. To crown his good fortune, John his enemy was embroiled with the court of Rome, which had lately excommunicated him. The eccleſiaſtical thunder was very favourable for Philip. Innocent II. put into his hands, and transferred to him, a perpetual right to the kingdom of England. This king of France, whom formerly excommunicated by the pope, had declared his cenſures void and abuſive; he thought very differently, however, when he found himſelf the executor of a bull inveſting him with the Engliſh crown. To give the greater force to the ſentence pronounced by his holineſs, he employed a whole year in building 1700 ſhips, and in preparing the fineſt army that was ever ſeen in France. Europe was in expectation of a deciſive battle between the two kings, when the pope laughed at both, and artfully took to himſelf what he had beſtowed upon Philip. A legate of the holy ſee perſuaded John Sans-terre to give his crown to the court of Rome, which received it with enthuſiaſm. Then Philip was expreſsly forbid by the pope to make any attempt upon England, now become a ſee of the Roman church, or againſt John who was under her protection. Meanwhile, the great preparations which Philip had made, alarmed all Europe; Germany, England, and the Low-Countries were united againſt him in the ſame manner as we have ſeen them united againſt Louis XIV. Ferrand, count of Flanders, joined the emperor Otho IV. He was Philip's vaſſal; which was the ſtrongeſt reaſon for declaring againſt him. The French king was nowiſe diſconcerted; his fortune and his courage diſſipated all his enemies. His valour was particularly conſpicuous at the battle of Bouvines, which was fought on the 27th of July 1214, and laſted from noon till night. Before the engagement, he knew well that ſome of his nobles followed him with reluctance. He aſſembled them together; and placing himſelf in the midſt of them, he took a large golden cup, which he filled with wine, and into which he put ſeveral ſlices of bread. He ate one of them himſelf, and offering the cup to the reſt, he ſaid, "My companions, let thoſe who would live and die with me follow my example." The cup was emptied in a moment, and thoſe who were the leaſt attached to him fought with all the bravery that could be expected from his warmeſt friends. It is alſo reported, that after ſhowing the army the crown that was worn by ſovereigns upon theſe occaſions, he ſaid, "If any one thought himſelf more worthy than he was to wear it, he had only to explain himſelf; that he ſhould be content it were the prize of that man who ſhould diſplay the greateſt valour in battle." The enemy had an army of 150,000 fighting men; that of Philip was not half ſo numerous; but it was compoſed of the flower of his nobility. The king run great hazard of his life; for he was thrown down under the horſes feet, and wounded in the neck. It is ſaid 30,000 Germans were killed; but the number is probably much exaggerated. The counts of Flanders and Boulogne were led to Paris with irons upon their feet and hands; a barbarous cuſtom which prevailed at that time. The French king made no conqueſt on the ſide of Germany

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after this ever memorable action; but it gained him an additional power over his vaſſals. Philip, conqueror of Germany, and poſſeſſor of almoſt all the Engliſh dominions in France, was invited to the crown of England by the ſubjects of King John, who were grown weary of his tyranny. The king of France, upon this occaſion, conducted himſelf like an able politician. He perſuaded the Engliſh to aſk his ſon Louis for their king; but as he wiſhed at the ſame time to manage the pope, and not loſe the crown of England, he choſe to aſſiſt the prince his ſon, without appearing to act himſelf. Louis made a deſcent upon England, was crowned at London, and excommunicated at Rome in 1216; but that excommunication made no change upon John's ſituation, who died of grief. His death extinguiſhed the reſentment of the Engliſh, who having declared themſelves for his ſon Henry III. forced Louis to leave England. Philip-Auguſtus died a little time after, at Mantes, the 14th of July 1223, aged 59, after a reign of 43 years. Of all the kings of the 3d race, he made the greateſt acceſſion to the crown-lands, and tranſmitted the greateſt power to his ſucceſſors. He reunited to his dominions Normandy, Anjou, Maine, Touraine, Poitou, &c. After having ſubdued John Sans-terre, he humbled the great lords, and by the overthrow of foreign and domeſtic enemies, took away the counterpoiſe which balanced his authority in the kingdom. He was more than a conqueror; he was a great king and an excellent politician; fond of ſplendor on public occaſions, but frugal in private life; exact in the adminiſtration of juſtice; ſkilful in employing alternately flattery and threatenings, rewards and puniſhments; he was zealous in the defence of religion, and always diſpoſed to defend the church; but he knew well how to procure from her ſuccours for ſupplying the exigencies of the ſtate. The lords of Coucy, Rhetel, Roſey, and ſeveral others, ſeized upon the property of the clergy. A great many of the prelates applied for protection to the king, who promiſed them his good offices with the depredators. But, notwithſtanding his recommendations, the pillages continued. The biſhops redoubled their complaints, and intreated Philip to march againſt their enemies. "With all my heart (ſaid he); but in order to fight them, it is neceſſary to have troops, and troops cannot be raiſed without money." The clergy underſtood his meaning; they furniſhed ſubſidies, and the pillages ceaſed. The enterpriſes of Philip-Auguſtus were almoſt always ſucceſsful; becauſe he formed his projects with deliberation, and executed them without delay. He began by rendering the French happy, and in the end rendered them formidable; though he was more inclined to anger than to gentleneſs, to puniſh than to pardon, he was regretted by his ſubjects as a powerful genius and as the father of his country. It was in his reign that the marſhal of France was ſeen, for the firſt time, at the head of the army. It was then, alſo, that families began to have fixed and hereditary ſurnames; the lords took them from the lands which they poſſeſſed; men of letters from the place of their birth; the converted Jews and rich merchants from that of their reſidence. Two very cruel evils, viz. leproſy and uſury were prevalent at that time; the one infected the body, the other proved the ruin of the fortunes of families. The number of lepers was ſo great, that the ſmalleſt villages were obliged to have an hoſpital for the cure of that diſtemper. It is remarkable, that when Philip was on the point of engaging Richard, the Engliſh, who were lying in ambuſh near the Loire, run away with his equipage, in which he cauſed to be carried all the deeds or writings reſpecting the rights of the crown; a cuſtom which is uſed at this day by the grand ſeignior. Philip cauſed copies of his charters to be collected wherever they could be found; but after all his endeavours, ſome of them were never recovered. The ſurname of *Auguſtus* was given to Philip by his cotemporaries. Mezerai is miſtaken, when he aſſerts that Paulus Emilius was the firſt who rendered the name of *conqueror* by that of Auguſtus; a learned critic has proved the contrary by undoubted authorities.

Philip of *Valois*, firſt king of France of the collateral branch of the Valois, was ſon to Charles count of Valois, brother of Philip *the Fair*. He mounted the throne in 1328, on the death of his couſin Charles the Fair, after having held for ſome time the regency of the kingdom. France was much divided in the beginning of his reign, by diſputes about the ſucceſſion to the crown. Edward III. king of England laid claim to it as grandſon of Philip the Fair, by his mother; but Philip of Valois took poſſeſſion of it as firſt prince of the blood. The people gave him, upon his acceſſion to the throne, the title of *fortunate;* to which might have been added, for ſome time, thoſe of *victorious* and *juſt*. He marched to the relief of his vaſſal the count of Flanders, whoſe ſubjects, on account of bad uſage, had taken up arms againſt him. He engaged the rebels at Caſſel, performed prodigies of valour, and gained a ſignal victory, the 24th of Auguſt 1328. Having made all quiet, he went home, after ſaying to the count of Flanders, "Be more prudent and more humane, and you will have fewer diſloyal ſubjects." The victorious Philip devoted the time of peace to the internal regulations of his kingdom. The financiers were called to an account, and ſome of them condemned to death; among others Peter Remi, general of the finances, who left behind him near 20 millions. He afterwards enacted the law reſpecting freeholds, impoſing a tax upon churches, and commoners who had acquired the lands of the nobility. Then, alſo, began to be introduced the form of *appel comme d'abus*, the principles of which are more ancient than the name. The year 1329 was diſtinguiſhed by a ſolemn homage paid to Philip, by Edward king of England, for the duchy of Guienne, upon his knees, and with his head uncovered. The interior peace of the kingdom was diſturbed by diſputes about the diſtinction of the church and ſtate. An aſſembly was ſummoned for hearing the two parties, in the preſence of the king: and in this aſſembly Peter de Cugnieres, his majeſty's advocate, defended the ſecular juriſdiction with great ability as a man well-informed, and an enlightened philoſopher. Bertrand biſhop of Autun, and Roger archbiſhop of Sens, pled the cauſe of the clergy with leſs ingenuity and judgement. This did not, however, prevent the king from ſhowing them favours, though the controverſy itſelf laid the foundation of all the diſputes which were afterwards agitated about the authority of the two powers; diſputes which contributed not a little to confine the eccleſiaſtical juriſdiction within narrower limits. While Philip was employing himſelf in ſome uſeful regulations, he was unhappily interrupted by Edward III. declaring war againſt France. This prince immediately recovered thoſe parts of Guienne of which Philip was in poſſeſſion. The Flemiſh having again revolted from France in ſpite of oaths and treaties, joined the ſtandard of Edward; and required that he would aſſume the title of *king of France*, in conſequence of his pretenſions to the crown; becauſe then, agreeably to the letter of their treaty, they only followed the king of France. From this period is dated the union of the flower-de-luce and leopards in the arms of England. Edward, in order to juſtify the change of his arms, cauſed the following manifeſto to be publiſhed in the verſe of the times.

> *Rex ſum regnorum, bina ratione, duorum:*
> *Anglorum in regno ſum rex ego jure paterno;*
> *Matris jure quidem Francorum nuncupor idem:*
> *Hinc eſt armorum variatio facta meorum.*

In the way of a parody to theſe lines, Philip made the following reply:

> *Prædo regnorum qui diceris eſſe duorum,*
> *Francorum regno privaberis, atque paterno,*
> *Succedunt mares huic regno, non mulieres:*
> *Hinc eſt armorum variatio ſtulta tuorum.*

In the mean time Philip put himſelf in a poſture of defence. His arms were at firſt attended with ſome ſucceſs; but thoſe advantages were far from compenſating the loſs of the battle of Ecluſe, in which the French fleet, conſiſting of 120 large ſhips, and manned by 40,000 ſeamen, was beat by that of England in the year 1340. This defeat is to be attributed, in part, to the little attention which had been paid to the navy of France, notwithſtanding her favourable ſituation, by being waſhed by two ſeas. She was obliged to make uſe of foreign ſhips, which obeyed but ſlowly, and even with ſome reluctance. This war, which had been alternately diſcontinued and renewed, began again with more heat than ever in 1345. The two armies having come to an engagement the 26th of Auguſt 1346, near Creſſy, a village in the county of Ponthieu, the Engliſh there gained a ſignal victory. Edward had only 40,000 men, while Philip had nearly twice that number; but the army of the former was inured to war, and that of the latter was ill-diſciplined and overcome with fatiguing marches. France loſt from 25,000 to 30,000 men; of which numbers were John king of Bohemia (who, though blind, fought gallantly), and about 1500 gentlemen, the flower of the French nobility. The loſs of Calais, and ſeveral other places, was the ſad fruit of this defeat. Some time before Edward had challenged Philip of Valois to a ſingle combat; which he refuſed, not on the ſcore of cowardice, but from the idea that it was improper for a ſovereign prince to accept a challenge from a king who was his vaſſal. At length, in 1347, a truce for ſix months was concluded between France and England, and afterwards prolonged at different times. Philip died a ſhort time after, the 23d of Auguſt 1350, aged 57 years, and far from bearing on his monument the title of *Fortunate*. He had, however, reunited Dauphiny to France. Humbert, the laſt prince of that country, having loſt all his children, and wearied with the wars which he had held out againſt Savoy, turned a Dominican, and gave his province to Philip, in 1349, on condition that the eldeſt ſon of the kings of France ſhould bear the title of Dauphin. Philip likewiſe added to his domain Rouſillon and a part of Cerdagne, by lending ſome money to the king of Majorca, who gave him thoſe provinces as a ſecurity; provinces which Charles VIII. afterwards reſtored without any reimburſement. It is ſurpriſing that in ſo unfortunate a reign he ſhould have been able to purchaſe thoſe provinces after having paid a great deal for Dauphiny; but the duty on ſalt, the riſe on the other taxes, and eſpecially the frauds committed in the coinage of money, are ſuppoſed to have enabled him to make thoſe acquiſitions. The fictitious and ideal value of the coin was not only raiſed, but a great deal of bad money was iſſued from the mint. The officers of the mint were ſworn upon the goſpels to keep the ſecret: but how could Philip flatter himſelf that ſo groſs a fraud would not be diſcovered?

Philip II. ſon of Charles V. and of Iſabella of Portugal, who was born at Valladolid on the 21ſt of May 1527, became king of Naples and Sicily by his father's abdication in 1554. He aſcended the throne of Spain on the 17th of January 1556 by the ſame means. Charles had made a truce with the French, but his ſon broke it; and having formed an alliance with England, poured into Picardy an army of 40,000 men. The French were cut to pieces at the battle of St Quintin, which was fought on the 20th of Auguſt 1557. That town was taken by aſſault, and the day on which the breach was mounted Philip appeared armed cap-a-pee in order to animate the ſoldiers. It was the firſt and laſt time that he was obſerved to wear this military dreſs. It is well known, indeed, that his terror was ſo great during the action that he made two vows; one, that he ſhould never again be preſent in a battle; and the other, to build a magnificent monaſtery dedicated to St Lawrence, to whom he attributed the ſucceſs of his arms, which he executed at Eſcurial, a village about ſeven leagues from Madrid. After the engagement, his general, the duke of Savoy, wanted to kiſs his hand; but Philip prevented him, ſaying, "It is rather my duty to kiſs your's, who have the merit of ſo glorious a victory;" and immediately preſented him with the colours taken during the action. The taking of Catelet, Ham, and Noyon, were the only advantages which were derived from a battle which might have proved the ruin of France. When Charles V. was informed of this victory, it is ſaid he aſked the perſon who brought him the intelligence, "if his ſon was at Paris?" and being anſwered in the negative, he went away without uttering a ſingle word. The duke of Guiſe having had time to aſſemble an army, repaired the diſgrace of his country by the taking of Calais and Thionville. While he was animating the French, Philip gained a pretty conſiderable battle againſt Marſhal de Thermes near Gravelines. His army was, on this occaſion, commanded by Count Egmont, whom he afterwards cauſed to be beheaded. The conqueror made no better uſe of the victory of Gravelines than he had done of that of St Quintin; but he reaped conſiderable advantage from the glorious peace of Cateau-Cambreſis, the maſterpiece of his politics. By that treaty, concluded the 13th of April 1559, he gained poſſeſſion of the ſtrong places of Thionville, Marienbourg, Montmedi, Heſdin, and the county of Charollois. This war, ſo terrible, and attended with ſo much cruelty, was terminated, like many others, by a marriage. Philip took for his third wife Elizabeth, daughter of Henry II. who had been promiſed to Don Carlos.

After theſe glorious atchievements, Philip returned in triumph to Spain, without having drawn a ſword. His firſt care, upon his arrival at Valladolid, was to demand of the grand inquiſitor the ſpectacle of an *auto-da-fe*. This was immediately granted him; 40 wretches, ſome of whom were prieſts or monks, were ſtrangled and burnt; and one of them was burnt alive. Don Carlos de Seza, one of thoſe unfortunate victims, ventured to draw near to the king, and ſaid to him, "How, Sir, can you ſuffer ſo many wretches to be committed to the flames? Can you be witneſs of ſuch barbarity without weeping?" To this Philip coolly replied, "If my own ſon were ſuſpected of hereſy, I would myſelf give him up to the ſeverity of the inquiſition. Such is the horror which I feel when I think of you and your companions, that if an executioner were wanting, I would ſupply his place myſelf." On other occaſions he conducted himſelf agreeably to the ſpirit which had dictated this anſwer. In a valley of Piedmont, bordering on the country of the Milaneſe, there were ſome heretics; and the governor of Milan had orders to put them all to death by the gibbet. The new opinions having found their way into ſome of the diſtricts of Calabria, he gave orders that the innovators ſhould be put to the ſword, with the reſervation of 60 of them, of whom 30 were afterwards ſtrangled, and the reſt committed to the flames.

This ſpirit of cruelty, and ſhameful abuſe of his power, had the effect to weaken that power itſelf. The Flemiſh, no longer able to bear ſo hard a yoke, revolted. The revolution began with the fine and large provinces of the continent; but the maritime provinces only obtained their liberty. In 1579 they formed themſelves into a republic, under the title of the United Provinces. Philip ſent the duke of Alba to reduce them; but the cruelty of that general only ſerved to exaſperate the ſpirit of the rebels. Never did either party fight with more courage, or with more fury. The Spaniards, at the ſiege of Haerlem, having thrown into the town the head of a Dutch officer who had been killed in a ſkirmiſh, the inhabitants threw to them the heads of eleven Spaniards, with this inſcription: "Ten heads for the payment of the tenth penny, and the eleventh for intereſt." Haerlem having ſurrendered at diſcretion, the conquerors cauſed all the magiſtrates, all the paſtors, and above 1500 citizens, to be hanged.

The duke of Alba, being at length recalled, the grand commander of the Requeſnes was ſent in his place, and after his death Don John of Auſtria; but neither of thoſe generals could reſtore tranquillity in the Low Countries. To this ſon of Charles V. ſucceeded a grandſon no leſs illuſtrious, namely, Alexander Farneſe duke of Parma, the greateſt man of his time; but he could neither prevent the independence of the United Provinces, nor the progreſs of that republic which aroſe under his own eye. It was then that Philip, always at his eaſe in Spain, inſtead of coming to reduce the rebels in Flanders, proſcribed the prince of Orange, and ſet 25,000 crowns upon his head. William, ſuperior to Philip, diſdained to make uſe of that kind of vengeance, and truſted to his ſword for his preſervation.

In the mean time the king of Spain ſucceeded to the crown of Portugal, to which he had a right by his mother Iſabella. This kingdom was ſubjected to him by the duke of Alba, in the ſpace of three weeks, in the year 1580. Antony, prior of Crato, being proclaimed king by the populace of Liſbon, had the reſolution to come to an engagement; but he was vanquiſhed, purſued, and obliged to fly for his life.

A cowardly aſſaſſin, Balthazar Gerard, by a piſtolſhot killed the prince of Orange, and thereby delivered Philip from his moſt implacable enemy. Philip was charged with this crime, it is believed without reaſon; though, when the news was communicated to him, he was imprudent enough to exclaim, "If this blow had been given two years ago, the Catholic religion and I would have gained a great deal by it."

This murder had not the effect to reſtore to Philip the Seven United Provinces. That republic, already powerful by ſea, aſſiſted England againſt him. Philip having reſolved to diſtreſs Elizabeth, fitted out, in 1588, a fleet called the *Invincible*. It conſiſted of 150 large ſhips, on which were counted 2650 pieces of cannon, 8000 ſeamen, 20,000 ſoldiers, and all the flower of the Spaniſh nobility. This fleet, commanded by the duke of Medina Sidonia, ſailed from Liſbon when the ſeaſon was too far advanced; and being overtaken by a violent ſtorm, a great part of it was diſperſed. Twelve ſhips, driven upon the coaſt of England, were captured by the Engliſh fleet, which conſiſted of 100 ſhips; 50 were wrecked on the coaſts of France, Scotland, Ireland, Holland, and Denmark. Such was the ſucceſs of the Invincible. See ARMADA.

This enterpriſe, which coſt Spain 40 millions of ducats, 20.000 men, and 100 ſhips, was productive only of diſgrace. Philip ſupported this misfortune with a heroic reſolution. When one of his courtiers told him, with an air of conſternation, what had happened, he coolly replied, "I ſent to fight the Engliſh, and not the winds. God's will be done." The day after Philip ordered the biſhops to return thanks to God for having preſerved ſome remains of his fleet; and he wrote thus to the pope: "Holy father, as long as I remain maſter of the fountain head, I ſhall not much regard the loſs of a rivulet. I will thank the Supreme Diſpoſer of empires, who has given me the power of eaſily repairing a diſaſter which my enemies muſt attribute ſolely to the elements which have fought for them."

At the ſame time that Philip attacked England, he was encouraging in France the Holy League; the object of which was to overturn the throne and divide the ſtate. The leaguers conferred upon him the title of *Protector* of their aſſociation; which he eagerly accepted, from a perſuaſion that their exertions would ſoon conduct him, or one of his family, to the throne of France. He thought himſelf ſo ſure of his prey, that when ſpeaking of the principal cities in France, he uſed to ſay, "My fine city of Paris, my fine city of Orleans," in the ſame manner as he would have ſpoken of Madrid and Seville. What was the reſult of all thoſe intrigues? Henry IV. embraced the Catholic religion, and by his abjuration of Proteſtantiſm made his rival loſe France in a quarter of an hour.

Philip, at length, worn out by the debaucheries of his youth, and by the toils of government, drew near his laſt hour. A ſlow fever, the moſt painful gout, and a complication of other diſorders, could not diſengage him from buſineſs, or draw from him the leaſt complaint.

plaint. "What!" ſaid he to the phyſicians who heſitated about letting blood of him; "What! are you afraid of drawing a few drops of blood from the veins of a king who has made whole rivers of it flow from heretics?" At laſt, exhauſted by a complication of diſtempers, which he bore with a heroic patience, and being eaten up of lice, he expired the 13th of September 1598, aged 72 years, after a reign of 43 years and eight months. During the laſt 50 days of his illneſs he ſhowed a great ſenſe of religion, and had his eyes almoſt always fixed towards heaven.

Watſon's Philip II.

No character was ever drawn by different hiſtorians in more oppoſite colours than that of Philip; and yet, conſidering the length and activity of his reign, there is none which it ſhould ſeem would be more eaſy to aſcertain. From the facts recorded in hiſtory, we cannot doubt that he poſſeſſed, in an eminent degree, penetration, vigilance, and a capacity for government. His eyes were continually open upon every part of his extenſive dominions. He entered into every branch of adminiſtration; watched over the conduct of his miniſters with unwearied attention; and in his choice both of them and of his generals, diſcovered a conſiderable ſhare of ſagacity. He had at all times a compoſed and ſettled countenance, and never appeared to be either elated or depreſſed. His temper was the moſt imperious, and his looks and demeanor were haughty and ſevere; yet among his Spaniſh ſubjects he was of eaſy acceſs; liſtened patiently to their repreſentations and complaints; and where his ambition and bigotry did not interfere, was generally willing to redreſs their grievances. When we have ſaid thus much in his praiſe, we have ſaid all that truth requires or truth permits. It is indeed impoſſible to ſuppoſe that he was inſincere in his zeal for religion. But as his religion was of the moſt corrupt kind, it ſerved to increaſe the natural depravity of his diſpoſition; and not only allowed, but even prompted, him to commit the moſt odious and ſhocking crimes. Although a prince in the bigotted age of Philip might be perſuaded that the intereſt of religion would be advanced by falſehood and perſecution; yet it might be expected, that, in a virtuous prince, the ſentiments of honour and humanity would on ſome occaſions triumph over the dictates of ſuperſtition: but of this triumph there occurs not a ſingle inſtance in the reign of Philip; who without heſitation violated his moſt ſacred obligations as often as religion afforded him a pretence, and under that pretence exerciſed for many years the moſt unrelenting cruelty without reluctance or remorſe. His ambition, which was exorbitant; his reſentment, which was implacable; his arbitrary temper, which would ſubmit to no controul—concurred with his bigotted zeal for the Catholic religion, and carried the ſanguinary ſpirit, which that religion was calculated to inſpire, to a greater height in Philip than it ever attained in any other prince of that or of any former or ſucceeding age.

Though of a ſmall ſize, he had an agreeable perſon. His countenance was grave, his air tranquil, and one could not diſcover from his looks either joy in proſperity or chagrin in adverſity. The wars againſt Holland, France, and England, coſt Philip 564 millions of ducats: but America furniſhed him with more than the half of that ſum. His revenues, after the junction of Portugal, are ſaid to have amounted to 25 millions of ducats, of which he only laid out 100,000 for the ſupport of his own houſehold. Philip was very jealous of outward reſpect; he was unwilling that any ſhould ſpeak to him but upon their knees. The duke of Alba having one day entered this prince's cabinet without being introduced, he received the following harſh ſalutation, accompanied with a ſtormy countenance: "An impudence like this of yours would deſerve the hatchet." If he thought only how to make himſelf be feared, he ſucceeded in doing ſo; for few princes have been more dreaded, more abhorred, or have cauſed more blood to flow, than Philip II. of Spain. He had ſucceſſively, if not all at once, war to maintain againſt Turkey, France, England, Holland, and almoſt all the Proteſtants of the empire, without having a ſingle ally, not even the branch of his own houſe in Germany. Notwithſtanding ſo many millions employed againſt the enemies of Spain, Philip found in his economy and his reſources wherewith to build 30 citadels, 64 fortified places, 9 ſea ports, 25 arſenals, and as many palaces, without including the Eſcurial. His debts amounted to 140 millions of ducats, of which, after having paid ſeven millions of intereſt, the greateſt part was due to the Genoeſe. Moreover, he had ſold or alienated a capital ſtock of 100 millions of ducats in Italy. He made a law, fixing the majority of the kings of Spain at 14 years of age. He affected to be more than commonly devout; he ate often at the refectory with the monks; he never entered their churches without kiſſing all the relics; he cauſed knead his bread with the water of a fountain which was thought to poſſeſs a miraculous virtue; he boaſted of never having danced, and of never wearing breeches after the Grecian faſhion. Grave and ſolemn in all his actions, he drove from his preſence a woman who had ſmiled while he was blowing his noſe. One great event of his domeſtic life is the death of his ſon Don Carlos. The manner of this prince's death is not certainly known. His body, which lies in the monument of the Eſcurial, is there ſeparated from his head; but it is pretended that the head is ſeparated only becauſe the leaden coffin which contains the body is too ſmall. The particulars of his crime are as little known as the manner in which it was committed. There is no evidence, nor is there any probability, that Philip would have cauſed him to be condemned by the inquiſition. All that we know of the matter is, that in 1568 his father, having diſcovered that he had ſome correſpondence with the Hollanders his enemies, arreſted him himſelf in his own room. He wrote at the ſame time to Pope Pius V. in order to give him an account of his ſon's impriſonment; and in his letter to this pontiff, the 20th of January 1568, he ſays, "that from his earlieſt years the ſtrength of a wicked nature has ſtifled in Don Carlos every paternal inſtruction." It was Philip II. who cauſed to be printed at Anvers, between 1569 and 1572, in 8 vols folio, the fine Polyglot Bible, which bears his name; and it was he who ſubjected the iſlands afterwards called the *Philippines*. He married ſucceſſively, 1ſt, Mary daughter of John III. king of Portugal; 2dly, Mary daughter of Henry VIII. and queen of England; 3dly, Elizabeth of France, daughter of Henry II.; 4thly, Anne, daughter of the emperor Maximilian II. Don Carlos was the ſon of his firſt wife, and Philip III. of the laſt.

PHILIPPI, in *Ancient Geography*, a town of Mace-

[illegible]

donia, in the territory of the Edones, on the confines of Thrace (Pliny, Ptolemy), ſituated on the ſide of a ſteep eminence; anciently called *Datum* and *Drenides* (Appian), though Strabo ſeems to diſtinguiſh them. This town was famous on ſeveral accounts; not only as taking its name from the celebrated Philip of Macedon, father to Alexander the Great, who conſidered it as a fit place for carrying on the war againſt the Thracians, but alſo on account of two battles fought in its neighbourhood between Auguſtus and the republican party. In the firſt of theſe battles, Brutus and Caſſius had the command of the republican army; while Octavianus, afterwards Auguſtus, and Mark Antony, had the command of their adverſaries. The army of Brutus and Caſſius conſiſted of 19 legions and 20,000 horſe; the imperial forces of an equal number of legions, but more complete, and 13,000 horſe: ſo that the numbers on both ſides were pretty equal. The troops of Brutus were very richly dreſſed, moſt of them having their armour adorned with gold and ſilver; for Brutus, though very frugal in other reſpects, was thus extravagant with reſpect to his men, thinking that the riches that they had about them would make them exert themſelves the more, to prevent theſe from falling into the enemy's hands. Both the republican generals appear to have been inferior in ſkill to Mark Antony; for as to Octavianus, he is allowed never to have conquered but by the valour of others. A little before the firſt engagement, Octavianus, who had been indiſpoſed, was carried out of the camp, at the perſuaſion of Artorius his phyſician, who had dreamed that he ſaw a viſion directing him to be removed. Brutus's men, who oppoſed the wing commanded by Octavianus, charged without orders, which cauſed great confuſion. However, they were ſucceſsful; for part of them, taking a compaſs about, fell upon the enemy's rear: after which they took and plundered the camp, making a great ſlaughter of ſuch as were in it, and among the reſt putting 2000 Lacedemonians to the ſword who were newly come to the aſſiſtance of Octavianus. The emperor himſelf was ſought for, but in vain, having been conveyed away for the reaſon above mentioned; and as the ſoldiers pierced the litter in which he was uſually carried, it was thence reported that he had been killed. This threw that whole part of the army into ſuch conſternation that when Brutus attacked them in front, they were moſt completely routed; three whole legions being cut in pieces, and a prodigious ſlaughter made among the fugitives. But by the imprudence of the general in purſuing too far, the wing of the republican army commanded by Caſſius was left naked and ſeparated from the reſt of the army; on which they were attacked at once in front and in flank, and thus they were defeated and their camp taken, while Brutus imagined that he had gained a complete victory. Caſſius himſelf retired to an eminence at a ſmall diſtance from Philippi; whence he ſent one of his greateſt intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the meſſenger ſet out. He ſoon met his friends; but they ſurrounding him to inquire the news, Caſſius, who beheld what paſſed, imagined that he was taken priſoner by the enemy, retired to his tent, and in deſpair cauſed one of his freedmen cut off his head. Thus far at leaſt is certain, that he went into the tent with that freedman, and that his head was found ſeparated from his body when Brutus entered. However, the freedman was never afterwards ſeen.

Philippi, Philippics.

The ſecond engagement was pretty ſimilar to the firſt. Brutus again oppoſed Octavianus, and met with the ſame ſucceſs; but in the mean time Antony, to whom he ought undoubtedly to have oppoſed himſelf, having to do only with the lieutenants of Caſſius, gained a complete victory over them. What was worſt, the fugitives, inſtead of leaving the field of battle altogether, fled for protection to Brutus's army; where crowding in among the ranks, they carried deſpair and confuſion wherever they went, ſo that a total defeat enſued, and the republican army was almoſt entirely cut in pieces. After the battle, Brutus put an end to his own life, as is related more fully under the article Rome.

The city of Philippi is likewiſe remarkable on account of an epiſtle written by St Paul to the church in that place. It was a Roman colony (Luke, Pliny, Coin, Inſcription). It is alſo remarkable for being the birth-place of Adraſtus, the Peripatetic philoſopher, and diſciple of Ariſtotle.—The town is ſtill in being, and is an archbiſhop's ſee; but greatly decayed and badly peopled. However, there is an old amphitheatre, and ſeveral other monuments of its ancient grandeur. E. Long. 42. 55. N. Lat. 41. 0.

PHILIPPICS, φιλιππικοι λογοι, in literature, is a name which is given to the orations of Demoſthenes againſt Philip king of Macedon. The Philippics are reckoned the maſter-pieces of that great orator: Longinus quotes many inſtances of the ſublime from them; and points out a thouſand latent beauties. Indeed that pathetic in which Demoſthenes excelled, the frequent interrogations and apoſtrophes wherewith he attacked the indolence of the Athenians, where could they be better employed? Whatever delicacy there be in the oration againſt Leptines, the Philippics have the advantage over it, were it only on account of the ſubject, which gives Demoſthenes ſo fair a field to diſplay his chief talent, we mean, with Longinus, that of moving and aſtoniſhing.

Dionyſius Halicarnaſſeus ranks the oration on the Haloneſe among the Philippics, and places it the eighth in order: but though his authority be great, yet that force and majeſty wherein Cicero characterizes the Philippics of Demoſthenes, ſeem to exclude the oration on the Haloneſe out of the number; and authorize the almoſt univerſal opinion of the learned, who reject it as ſpurious. Libanius, Photius, and others, but above all the languidneſs of the ſtyle, and the lowneſs of the expreſſions, which reign throughout the whole, father it on Hegeſippus.

Philippic is likewiſe applied to the fourteen orations of Cicero againſt Mark Antony. Cicero himſelf gave them this title in his epiſtles to Brutus; and poſterity have found it ſo juſt, that it has been continued to our times. Juvenal, Sat. x. calls the ſecond the *divine Philippic*, and witneſſes it to be of great fame, *conſpicuæ divina Philippica famæ*. That orator's intitling his laſt and moſt valued orations after the Philippics of Demoſthenes ſhews the high opinion he had of them. Cicero's Philippics coſt him his life; Mark Antony having been ſo irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, Philippine Iſlands.

der, cut off his head, and ſtuck it up in the very place where the orator had delivered the Philippics.

PHILIPPINE ISLANDS, are certain iſlands of Aſia, which lie between 114 and 126 degrees of eaſt longitude, and between 6 and 20 degrees of north latitude; about 300 miles ſouth-eaſt of China. They are ſaid to be about 1200 in number, of which there are 400 very conſiderable. They form a principal diviſion of that immenſe Indian Archipelago, which conſiſts of ſo many thouſand iſlands, ſome of which are the largeſt, and many of them the richeſt, in the world. The Philippines form the northernmoſt cluſter of theſe iſlands, and were diſcovered in the year 1521 by the famous navigator Ferdinand Magellan, a Portugueſe gentleman, who had ſerved his native country both in the wars of Africa and in the Eaſt Indies; particularly under Albuquerque, the famous Portugueſe general, who reduced Goa and Malacca to the obedience of that crown. Magellan having had a conſiderable ſhare in thoſe actions, and finding himſelf neglected by the government of Portugal, and even denied, as it is ſaid, the ſmall advance of a ducat a month in his pay, left the court of Portugal in diſguſt, and offered his ſervices to Charles V. then emperor of Germany and king of Spain, whom he convinced of the probability of diſcovering a way to the Spice iſlands, in the Eaſt Indies, by the weſt: whereupon the command of five ſmall ſhips being given him, he ſet ſail from Seville, on the 10th of Auguſt 1519, and ſtanding over to the coaſt of South America, proceeded ſouthward to 52°, where he fortunately hit upon a ſtrait, ſince called the *Strait of MAGELLAN*, which carried him into the Pacific ocean or South ſea; and then ſteering northward, repaſſed the equator: after which, he ſtretched away to the weſt, acroſs that vaſt ocean, till he arrived at Guam, one of the Ladrones, on the 16th of March 1521; and ſoon after ſailed to the weſtward, and diſcovered the Philippines, which he did on St Lazarus's day; and, in honour of that ſaint, he called them the *Archipelago of St Lazarus*. He took poſſeſſion of them in the name of the king of Spain, but happened to be killed in a ſkirmiſh he had with the natives of one of them. His people, however, arrived afterwards at the Moluccas, or Clove iſlands, where they left a colony, and returned to Spain by the way of the Cape of Good Hope; being the firſt perſons that ever ſailed round the globe.—But there was no attempt made by the Spaniards to ſubdue or plant the Philippine iſlands until the year 1564, in the reign of Philip II. ſon of Charles V. when Don Louis de Velaſco, viceroy of Mexico, ſent Michael Lopez Delagaſpes thither with a fleet, and a force ſufficient to make a conqueſt of theſe iſlands, which he named the *Philippines*, in honour of Philip II. then upon the throne of Spain; and they have remained under the dominion of that crown till taken by Sir William Draper. The Philippines are ſcarce inferior to any other iſlands of Aſia in all the natural productions of that happy climate; and they are by far the beſt ſituated for an extenſive and advantageous commerce. By their poſition, they form the centre of intercourſe with China, Japan, and the Spice iſlands; and whilſt they are under the dominion of Spain, they connect the Aſiatic and American commerce, and become a general magazine for the rich manufactures of the one and for the treaſures of the other. Beſides, they are well ſituated for a ſupply of European goods, both from the ſide of Acapulco and by the way of the Cape of Good Hope. In fact, they formerly enjoyed a traffic in ſome degree proportioned to the peculiar felicity of their ſituation; but the Spaniſh dominion is too vaſt and unconnected to be improved to the beſt advantage.—The ſpirit of commerce is not powerful in that people. The trade of the Philippines is thought to have declined; its great branch is now reduced to two ſhips, which annually paſs between theſe iſlands and Acapulco in America, and to a ſingle port of Manilla in the iſland of Luconia.

Beatſon's Nav. Mem.

Indeed the Spaniards appear by no means to be actuated by the ſpirit of induſtry; for, ſo far from improving the fine ſituation of their iſlands to the utmoſt, it happens, on the contrary, that the trade is hurtful to the mother-country; for (to confine ourſelves to Manilla, with which they have moſt to do), inſtead of taking Spaniſh manufactures, they trade with the Chineſe for ſpices, ſilks, ſtockings, Indian ſtuffs, callicoes, chintz, and many other articles; and with the Japaneſe for cabinets, and all ſorts of lacquered ware; for all which they pay in gold or ſilver. All theſe commodities, together with what the iſlands produce, and great quantities of wrought plate by the Chineſe artiſans, are collected at Manilla, and tranſported annually in two ſhips to Acapulco in Mexico. Each of theſe ſhips is eſteemed worth 600,000l. ſterling; and in the war which began in 1739, and which was not diſtinguiſhed by ſuch a ſeries of wonderful ſucceſſes as that which ended in 1763, the taking of one of the galleons which carry on the trade between Manilla and America, was conſidered as one of the moſt brilliant advantages which we gained. This trade is not laid open to all the inhabitants of Manilla, but is confined by very particular regulations, ſomewhat analogous to thoſe by which the trade of the regiſter ſhips from Cadiz to the Weſt Indies is reſtrained. The ſhips employed are all king's ſhips, commiſſioned and paid by him; and the tonnage is divided into a certain number of bales, all of the ſame ſize. Theſe are divided among the convents at Manilla, but before the ſuppreſſion of the Jeſuits principally among them, as a donation to ſupport their miſſions, for the propagation of the Roman Catholic faith. Moſt of the religious are concerned in this trade, and ſell to the merchants at a great price what room in the ſhip they are not to occupy. This trade is by a royal edict limited to a certain value, but it always exceeds it, each ſhip being generally worth 3,000,000 of dollars. The returns made from America are in ſilver, cochineal, ſweetmeats, together with ſome European millinery ware for the women, and ſome ſtrong Spaniſh wine. It is obvious, that the greateſt part of the treaſure remitted does not remain at Manilla, but is diſperſed over India for goods. Many ſtrong remonſtrances againſt this Indian trade to Mexico have been made to the court of Spain, wherein they urge, that the ſilk manufactories of Valentia and other parts of Spain, the linens from Cadiz, and their other manufactories, are hurt in their ſale in Mexico and Peru, by the Chineſe being able to afford them goods of the ſame ſort cheaper than they are able; that were this trade laid open, the whole treaſure of the New World would centre in Spain, or with European merchants; but now it enriches only ſome religious orders and a few private perſons. Wiſe as theſe arguments are, the Jeſuits and prieſts, verſant in intrigue, Philippine Iſlands.

and the moſt ſelfiſh ſet of men on earth, had intereſt enough at court to ſtop the effect.

At Cavite in this bay are a fort, a town, and a fine dock-yard, where theſe large galleons are built and repaired, and where they load and unload, together with all the other large ſhips that trade to this bay.

The principal of the Philippine iſlands are Luconia or Manilla, Tandago or Samar, Maſbate, Mindora, Luban, Paragoa, Panay, Leyte, Bohel, Sibu, Sogbu, Negros, St John, Xolo, and Mindanao. In moſt of theſe, the Spaniſh power prevails, and all are under the governor of Luconia; but there are ſome in which that nation has little authority, or even influence, ſuch as Mindanao.

The inhabitants of theſe iſlands conſiſt of Chineſe, Ethiopians, Malays, Spaniards, Portugueſe, Pintados or Painted People, and Meſtees, a mixture of all theſe. Their perſons and habits reſemble thoſe of the ſeveral nations whence they derive their original; only, it is obſervable, that the features of the blacks of theſe iſlands are as agreeable as thoſe of the white people. There is not a ſoil in the world that produces greater plenty of all things for life; as appears by the multitude of inhabitants to be found in the woods and mountains, who ſubſiſt almoſt entirely by the fruits of the earth, and the veniſon they take. Nor can any country appear more beautiful; for there is a perpetual verdure, and buds, bloſſoms, and fruit, are found upon the trees all the year round, as well on the mountains as in the cultivated gardens. Vaſt quantities of gold are waſhed down from the hills by the rains, and found mixed with the ſand of their rivers. There are alſo mines of other metals, and excellent loadſtones found here; and ſuch numbers of wild buffaloes, that a good huntſman on horſeback, armed with a ſpear, may kill 10 or 20 in a day. The Spaniards take them for their hides, which they ſell to the Chineſe; and their carcaſes ſerve the mountaineers for food. Their woods alſo abound with deer, wild hogs, and goats. Of the laſt, there is ſuch plenty in one of theſe iſlands, that the Spaniards gave it the name of *Cabras*. Horſes and cows have been likewiſe imported into theſe iſlands, from New Spain, China, and Japan, which have multiplied conſiderably; but the ſheep that were brought over came to nothing. The trees produce a great variety of gums; one kind, which is the commoneſt, by the Spaniards called *brea*, is uſed inſtead of pitch; of the others ſome are medicinal, others odoriferous.

In thoſe iſlands are monkeys and baboons of ſuch a ſize, as to defend themſelves if attacked by men. When they can find no fruit in the mountains, they go down to the ſea to catch crabs and oyſters; and that the oyſters may not cloſe and catch their paws, they firſt put in a ſtone to prevent their ſhutting cloſe: they take crabs by putting their tail in the holes where they lie, and when the crab lays hold of it, they draw him out. There are alſo great numbers of civet-cats in ſome of the iſlands. The bird called *tavan*, is a black ſea-fowl, ſomething leſs than a hen, and has a long neck; it lays its eggs in the ſand by the ſea-ſide, 40 or 50 in a trench, and then covers them, and they are hatched by the heat of the ſun. They have likewiſe the bird *ſaligan*, which builds her neſt on the ſides of rocks. This is a ſpecies of ſwallow the neſts of which are ſo much eſteemed in the eaſt, being a kind of jelly that diſſolves in warm water.

Philippine Iſlands ‖ Philips.

The Spaniards have introduced ſeveral of the American fruits, which thrive here as well as in America; the cocoa or chocolate-nut particularly, which increaſes ſo that they have no occaſion now to import it from Mexico. Here is alſo the *FOUNTAIN-Tree*, from which the natives draw water; and there is likewiſe a kind of cane, by the Spaniards called *vaxuco*, which, if cut, yields fair water enough for a draught, of which there is plenty in the mountains, where water is moſt wanted.

Theſe iſlands being hot and moiſt, produce abundance of venomous creatures, as the ſoil does poiſonous herbs and flowers, which do not kill thoſe who touch or taſte them, but ſo infect the air, that many people die in the time of their bloſſoming.

The orange, lemon, and ſeveral other trees, bear twice a-year. A ſprig, when planted, becomes a tree and bears fruit in a year's time; ſo that without any hyperbole it may be affirmed, that a more luxuriant verdant ſoil can ſcarcely be conceived. The woods are filled with old, large, and lofty trees, and ſuch as yield more ſuſtenance to man than is to be found in almoſt any other part of the world. Theſe iſlands, however, beſides their other inconveniences, of which they have many, are very ſubject to earthquakes, which often prove very fatal. See MANILLA.

PHILIPPINES, a religious ſociety of young women at Rome, ſo called from their taking St Philip de Neri for their protector. The ſociety conſiſts of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of ſome religious women, who teach them to read, write, and work, and inſtruct them in the duties of Chriſtianity. They wear a white veil, and a black croſs on their breaſts. See MACEDONIA.

PHILIPPISTS, a ſect or party among the Lutherans; the followers of Philip Melancthon. He had ſtrenuouſly oppoſed the Ubiquiſts, who aroſe in his time; and the diſpute growing ſtill hotter after his death, the univerſity of Wirtemberg, who eſpouſed Melancthon's opinion, were called by the Flacians, who attacked it, *Philippiſts*.

PHILIPS, FABIAN, was author of ſeveral books relating to ancient cuſtoms and privileges in England. He was born at Preſtbury in Glouceſterſhire, September 28. 1601. When very young, he ſpent ſome time in one of the Inns of Chancery; and went from thence to the Middle-Temple, where he became learned in the law. In the civil wars, he was a bold aſſertor of the king's prerogative; and was ſo ſtrongly attached to Charles I. that, two days before that monarch was beheaded, he wrote a proteſtation againſt the intended murder, and cauſed it to be printed, and affixed to poſts in all public places. He likewiſe publiſhed, in 1649, 4to, a pamphlet entitled, "*Veritas Inconcuſſa*; or King Charles I. no Man of Blood, but a Martyr for his People:" which was reprinted in 1660, 8vo. In 1663, when the courts of juſtice at Weſtminſter, eſpecially the chancery, were voted down by Oliver's parliament, he publiſhed, "Conſiderations againſt the diſſolving and taking them away:" for which he received the thanks of parliament. He was for ſome time filazer for London,

don, Middleſex, Cambridgeſhire, and Huntingdonſhire; and ſpent much money in ſearching records, and writing in favour of the royal prerogative. The only advantage he received for this attachment to the royal cauſe was, the place of one of the commiſſioners for regulating the law, worth 200l. per annum, which only laſted two years. After the reſtoration of Charles II. when the bill for taking away the tenures was depending in parliament, he wrote and publiſhed a book to ſhow the neceſſity of preſerving them, entitled, "*Tenenda non tollenda*; or, the Neceſſity of preſerving Tenures *in capite*, and by Knight's-ſervice, which, according to their firſt inſtitution, were, and are yet, a great part of the *ſalus populi*, &c. 1660," 4to. In 1663 he publiſhed, "The Antiquity, Legality, Reaſon, Duty, and Neceſſity of Pre-emption and Pourveyance for the King," 4to; and afterwards many other pieces upon ſubjects of a ſimilar kind. He aſſiſted Dr Bates in his "*Elenchus Motuum*; eſpecially in ſearching the records and offices for that work. He died, November 17th, 1690, in his 89th year. He was a man well acquainted with records and antiquities; but his manner of writing is neither cloſe nor well digeſted. He publiſhed a political pamphlet in 1681, entitled "*Urſa Major et Minor*; ſhowing that there is no ſuch Fear, as is factitiouſly pretended, of Popery and arbitrary Power."

Philips, *Ambroſe*, an Engliſh poet, was deſcended from a very ancient and conſiderable family of that name in Leiceſterſhire. He received his education at St John's college, Cambridge; during his ſtay at which univerſity, he wrote his paſtorals, which acquired him at that time ſo high a reputation. His next performance was, The Life of Archbiſhop Williams, written, according to Mr Cibber, to make known his political principles, which in the courſe of it he had a free opportunity of doing, as the archbiſhop, who is the hero of his work, was a ſtrong opponent to the high-church meaſures.

When he quitted the univerſity, and came to London, he became a conſtant attendant at, and one of the wits of, Button's coffee-houſe, where he obtained the friendſhip and intimacy of many of the celebrated geniuſes of that age, more particularly of Sir Richard Steele, who, in the firſt volume of his Tatler, has inſerted a little poem of Mr Philips's, which he calls a Winter Piece, dated from Copenhagen, and addreſſed to the earl of Dorſet, on which he beſtows the higheſt encomiums; and, indeed, ſo much juſtice is there in theſe his commendations, that even Mr Pope himſelf, who had a fixed averſion for the author, while he affected to deſpiſe his other works, uſed always to except this from the number.

The firſt diſlike Mr Pope conceived againſt Mr Philips, proceeded from that jealouſy of fame which was ſo conſpicuous in the character of that great poet; for Sir Richard Steele had taken ſo ſtrong a liking to the paſtorals of the latter, as to have formed a deſign for a critical compariſon of them with thoſe of Pope, in the concluſion of which the preference was to have been given to Philips. This deſign, however, coming to Mr Pope's knowledge, that gentleman, who could not bear a rival near the throne, determined to ward off this ſtroke by a ſtratagem of the moſt artful kind; which was no other than taking the ſame taſk on himſelf; and, in a paper in the Guardian, by drawing the like compariſon, and giving a like preference, but on principles of criticiſm apparently fallacious, to point out the abſurdity of ſuch a judgment. However, notwithſtanding the ridicule that was drawn on him in conſequence of his ſtanding as it were in competition with ſo powerful an antagoniſt, it is allowed, that there are, in ſome parts of Philips's paſtorals, certain ſtrokes of nature, and a degree of ſimplicity, that are much better ſuited to the purpoſes of paſtoral, than the more correctly turned periods of Mr Pope's verſification. Mr Philips and Mr Pope being of different political principles, was another cauſe of enmity between them; which aroſe at length to ſo great a height, that the former, finding his antagoniſt too hard for him at the weapon of wit, had even determined on making uſe of a rougher kind of argument; for which purpoſe he even went ſo far as to hang up a rod at Button's for the chaſtiſement of his adverſary whenever he ſhould come thither; which, however, Mr Pope declining to do, avoided the *argumentum baculinum*, in which he would, no doubt, have found himſelf on the weakeſt ſide of the queſtion. Our author alſo wrote ſeveral dramatical pieces; The Briton, Diſtreſſed Mother, and Humphrey Duke of Glouceſter; all of which met with ſucceſs, and one of them is at this time a ſtandard of entertainment at the theatres, being generally repeated ſeveral times in every ſeaſon. Mr Philips's circumſtances were in general, through his life, not only eaſy, but rather affluent, in conſequence of his being connected, by his political principles, with perſons of great rank and conſequence. He was concerned with Dr Hugh Boulter, afterwards archbiſhop of Armagh, the right honourable Richard Weſt, Eſq. lord chancellor of Ireland, the reverend Mr Gilbert Burnet, and the reverend Mr Henry Stevens, in writing a ſeries of papers called the *Free Thinker*, which were all publiſhed together by Mr Philips, in three volumes in 12mo.

In the latter part of Queen Anne's reign, he was ſecretary to the Hanover club, who were a ſet of noblemen and gentlemen who had formed an aſſociation in honour of that ſucceſſion, and for the ſupport of its intereſts, and who uſed particularly to diſtinguiſh in their toaſts ſuch of the fair ſex as were moſt zealouſly attached to the illuſtrious Houſe of Brunſwic. Mr Philip's ſtation in this club, together with the zeal ſhown in his writings, recommended him to the notice and favour of the new government. He was, ſoon after the acceſſion of King George I. put into the commiſſion of the peace, and appointed one of the commiſſioners of the lottery. And, on his friend Dr Boulter's being made primate of Ireland, he accompanied that prelate acroſs St George's Channel, where he had conſiderable preferments beſtowed on him, and was elected a member of the Houſe of Commons there, as repreſentative for the county of Armagh. At length, having purchaſed an annuity for life of 400l. per annum, he came over to England ſome time in the year 1748; but having a very bad ſtate of health, and being moreover of an advanced age, he died ſoon after, at his lodgings near Vauxhall, in Surry.

"Of his perſonal character (ſays Dr Johnſon) all I have heard is, that he was eminent for bravery, and ſkill in the ſword, and that in converſation he was ſolemn and pompous." He is ſomewhere called *Quaker Philips*, but, however, appears to have been a man of integrity sity; for the late Paul Whitehead relates, that when Mr Addiſon was ſecretary of ſtate, Philips applied to him for ſome preferment, but was coolly anſwered, "that it was thought that he was already provided for, by being made a juſtice for Weſtminſter." To this obſervation our author, with ſome indignation, replied, "Though poetry was a trade he could not live by, yet he ſcorned to owe ſubſiſtence to another which he ought not to live by."

The following anecdote is told of our author by Dr Johnſon: "At a coffee houſe, he (Philips) was dicourſing upon pictures, and pitying the painters, who, in their hiſtorical pieces, always draw the ſame ſort of *ſky*." "They ſhould travel (ſaid he), and then they would ſee that there is a different *ſky* in every country, in England, France, Italy, and ſo forth." "Your remark is juſt (ſaid a grave gentleman who ſat by), I have been a traveller, and can teſtify what you obſerve is true; but the greateſt variety of *ſkies* that I found was in Poland." "In Poland, Sir? (ſays Philips)." "Yes, in Poland; for there is Sobie*ſky*, and Sabrun*ſky*, and Jablon*ſky*, and Podebra*ſky*, and many more *ſkies*."

Philips, *Catharine*, a very ingenious lady, the daughter of Mr John Fowler merchant, was born at London in January 1631, and educated at a ſchool at Hackney. She married James Philips of the priory of Cardigan, Eſq. and went with the viſcounteſs of Dungannon into Ireland, where ſhe tranſlated Corneille's tragedy of Pompey into Engliſh, which was ſeveral times acted there with great applauſe.

She tranſlated alſo the four firſt acts of Horace, another tragedy of Corneille, the fifth being done by Sir John Denham. This excellent and amiable lady, for ſuch it ſeems ſhe was, died of the ſmall-pox in London, the 22d of June 1664, much and juſtly regretted; "having not left (ſays Langbaine) any of her ſex her equal in poetry.—She not only equalled (adds he) all that is reported of the poeteſſes of antiquity, the Leſbian Sappho and the Roman Sulpitia, but juſtly found her admirers among the greateſt poets of our age." Cowley wrote an ode upon her death. Dr Jeremy Taylor had addreſſed to her his "Meaſures and Offices of Friendſhip:" the ſecond edition of which was printed in 1657, 12mo. She aſſumed the name of *Orinda*. In 1667, were printed, in folio, "Poems by the moſt deſervedly admired Mrs Catharine Philips, the matchleſs Orinda. To which is added, Monſieur Corneille's Pompey and Horace, tragedies. With ſeveral other tranſlations from the French;" and her picture before them, engraven by Faithorne. There was likewiſe another edition in 1678, folio; in the preface of which we are told, that "ſhe wrote her familiar letters with great facility, in a very fair hand, and perfect orthography; and if they were collected with thoſe excellent diſcourſes ſhe wrote on ſeveral ſubjects, they would make a volume much larger than that of her poems." In 1705, a ſmall volume of her letters to Sir Charles Cottrel was printed, under the title of "Letters from Orinda to Poliarchus." The editor of theſe letters tells us, that "they were the effect of an happy intimacy between herſelf and the late famous Poliarchus, and are an admirable pattern for the pleaſing correſpondence of a virtuous friendſhip. They will ſufficiently inſtruct us, how an intercourſe of writing between perſons of different ſexes ought to be managed with delight and innocence; and teach the world not to load ſuch a commerce with cenſure and detraction, when it is removed at ſuch a diſtance from even the appearance of guilt."

Philips, *John*, an eminent Engliſh poet, was born in 1676. He was educated at Wincheſter and Oxford, where he became acquainted with Milton, whom he ſtudied with great application, and traced in all his ſucceſsful tranſlations from the ancients. The firſt poem which diſtinguiſhed our author, was his Splendid Shilling, which is in the Tatler ſtyled the "fineſt burleſque poem in the Engliſh language." His next was entitled Blenheim, which he wrote at the requeſt of the earl of Oxford, and Mr Henry St John, afterwards Lord Bolingbroke, on the victory obtained there by the duke of Marlborough in 1704. It was publiſhed in 1705; and the year after he finiſhed another poem upon cyder, the firſt book of which had been written at Oxford. It is on the model of Virgil's Georgics, and is a very excellent piece. We have no more of Mr Philips but a Latin ode to Henry St John, Eſq. which is eſteemed a maſterpiece. He was contriving greater things; but illneſs coming on, he was obliged to drop every thing but the care of his health. This care, however, did not ſave him: for, after lingering a long time, he died at Hereford, Feb. 15. 1708, of a conſumption and aſthma, before he had reached his 33d year. He was interred in the cathedral of that city with an inſcription over his grave; and had a monument erected to his memory in Weſtminſter-abbey by Sir Simon Harcourt, afterwards lord-chancellor, with an epitaph upon it written by Dr Atterbury, though commonly aſcribed to Dr Freind. He was one of thoſe few poets whoſe muſe and manners were equally excellent and amiable; and both were ſo in a very eminent degree.

Dr Johnſon obſerves, that "Philips has been always praiſed, without contradiction, as a man modeſt, blameleſs, and pious; who bore a narrow fortune without diſcontent, and tedious and painful maladies without impatience; beloved by thoſe that knew him, but not ambitious to be known. He was probably not formed for a wide circle. His converſation is commended for its innocent gaiety, which ſeems to have flowed only among his intimates; for I have been told, that he was in company ſilent and barren, and employed only upon the pleaſures of his pipe. His addiction to tobacco is mentioned by one of his biographers, who remarks, that in all his writings except Blenheim he has found an opportunity of celebrating the fragrant fume. In common life, he was probably one of thoſe who pleaſe by not offending, and whoſe perſon was loved, becauſe his writings were admired. He died honoured and lamented, before any part of his reputation had withered, and before his patron St John had diſgraced him. His works are few. The Splendid Shilling has the uncommon merit of an original deſign, unleſs it may be thought precluded by the ancient *Centos*. To degrade the founding works and ſtately conſtruction of Milton, by an application to the loweſt and moſt trivial things, gratifies the mind with a momentary triumph over that grandeur which hitherto held its captives in admiration; the words and things are preſented with a new appearance, and novelty is always grateful where it gives no pain. But the merit of ſuch performances begins and ends

Philips, Philipſburg.

with the firſt author. He that ſhould again adapt Milton's phraſe to the groſs incidents of common life, and even adapt it with more art, which would not be difficult, muſt yet expect but a ſmall part of the praiſe which Philips has obtained: he can only hope to be conſidered as the repeater of a jeſt.

"There is a Latin ode written to his patron St John, in return for a preſent of wine and tobacco, which cannot be paſſed without notice. It is gay and elegant, and exhibits ſeveral artful accommodations of claſſic expreſſions to new purpoſes. It ſeems better turned than the odes of Hannes. To the poem on cyder, written in imitation of the Georgics, may be given this peculiar praiſe, that it is grounded in truth; that the precepts which it contains are exact and juſt; and that it is therefore at once a book of entertainment and of ſcience. This I was told by Miller, the great gardener and botaniſt, whoſe expreſſion was, that 'there were many books written on the ſame ſubject in proſe, which do not contain ſo much truth as that poem.' In the diſpoſition of his matter, ſo as to interſperſe precepts relating to the culture of trees, with ſentiments more generally pleaſing, and in eaſy and graceful tranſitions from one ſubject to another, he has very diligently imitated his maſter; but he unhappily pleaſed himſelf with blank verſe, and ſuppoſed that the numbers of Milton, which impreſs the mind with veneration, combined as they are with ſubjects of inconceivable grandeur, could be ſuſtained by images which at moſt can riſe only to elegance. Contending angels may ſhake the regions of heaven in blank verſe; but the flow of equal meaſures, and the embelliſhment of rhime, muſt recommend to our attention the art of engrafting, and decide the merit of the redſtreak and pearmain. What ſtudy could confer, Philips had obtained; but natural deficiency cannot be ſupplied. He ſeems not born to greatneſs and elevation. He is never lofty, nor does he often ſurpriſe with unexpected excellence: but perhaps to his laſt poem may be applied what Tully ſaid of the work of Lucretius, that 'it is written with much art, though with few blazes of genius.'"

It deſerves to be remarked, that there were two poets of both the names of our author, and who flouriſhed in his time. One of them was Milton's nephew, and wrote ſeveral things, particularly ſome memoirs of his uncle, and part of Virgil Traveſtied. The other was the author of two political farces, which were both printed in 1716; 1. The Earl of Marr married, with the Humours of Jocky the Highlander. 2. The Pretender's Flight; or a Mock Coronation, with the Humours of the facetious Harry St John.

PHILIPSBURG, is an imperial town of Germany, in the circle of the Upper Rhine. It is very ſtrong, and looked upon as one of the bulwarks of the empire. It is ſeated in a moraſs, and fortified with ſeven baſtions, and ſeveral advanced works. The town belongs to the biſhop of Spire, but all the works and the fortifications to the empire. It has been ſeveral times taken and retaken, particularly by the French in 1734, when the duke of Berwick was killed at the ſiege; but it was rendered back the year following, in conſequence of the treaty of Vienna. It is ſeated on the river Rhine, over which there is a bridge ſeven miles ſouth of Spire, 22 [illegible] of Worms, and 42 north-eaſt of Straſburg. E. Long. 8. 33. N. Lat. 49. 12.

Philiſtea, Philiſtines.

PHILISTÆA, in *Ancient Geography*, the country of the Philiſtines (Moſes); which lying along the Mediterranean, from Joppa to the borders of Egypt, and extending [illegible] from the ſea. [illegible], the proper *Palæſtina*, the country [illegible]. Afterwards applied to the whole of the Holy Land and its inhabitants. *Philiſtim*, the people [illegible] *Philiſtim* (Moſes); the *Caphtorim* and *Caſluhim* originally from Egypt, and deſcendants of Cham partly; who expelled and deſtroyed the Hivites, the ancient inhabitants, and occupied their country; that is, the region which retained the name of *Philiſtia*, in which the *Caphtorim* were ſwallowed up.

PHILISTINES, were the ancient inhabitants of Paleſtine, well known in ſacred hiſtory. Theſe people are ſometimes called in Scripture *Cherethites* and *Caphtorim*. The earlier part of their hiſtory is, like that of moſt other nations, very obſcure and uncertain. The authors of the Univerſal Hiſtory tell us, that they were deſcended from the Caſluhim partly, and partly from the Caphtorim, both from the loins of Mizraim the ſon of Ham, the ſon of Noah. Moſes tells us (Deut. ii. 23.), that they drove out the Avim or Avites even to Azzah or Gazah, where they ſettled; but when this happened cannot be determined. On the whole, however, our learned authors are clearly of opinion, that the Caſluhim and Caphtorim, from whom the Philiſtines are deſcended, came originally from Egypt, and called the country which they had conquered by their own name (See PALESTINE). Many interpreters, however, think, that Caphtor was but another name for Cappadocia, which they imagine to have been the original country of the Philiſtines. But Father Calmet, in a particular diſſertation prefixed to the firſt book of Samuel, endeavours to ſhow that they were originally of the iſle of Crete. The reaſons which led him to think that Caphtor is the iſle of Crete are as follow: The Philiſtines were ſtrangers in Paleſtine, as appears in various parts of Scripture; ſuch as Gen. x. 14. Deut. ii. 23. Jer. xlvii. 4. and Amos ix. 7. whence the Septuagint always tranſlate this name *Strangers*. Their proper name was Cherethims, for Ezekiel (xxv. 16.), ſpeaking againſt the Philiſtines, has theſe words, "I will ſtretch out mine hand upon the Philiſtines, and I will cut off the Cherethims, and deſtroy the remnant of the ſea-coaſt." Zephaniah (ii. 5.), inveighing againſt the ſame people, ſays, "Wo unto the inhabitants of the ſea-coaſts, the nation of the Cherethites." And Samuel (Book I. xxx. 14.) ſays, that the Amalekites made an irruption into the country of the Cherethites, that is to ſay, of the Philiſtines, as the ſequel of the diſcourſe proves. And afterwards the kings of Judah had foreign guards called the *Cherethites* and *Pelethites*, who were of the number of the Philiſtines (2 Sam. xv. 18.) The Septuagint, under the name *Cherethites*, underſtood the *Cretans*; and by *Cherith* they underſtood *Crete*. Beſides the Scripture ſays, that the Philiſtines came from the iſle of Caphtor. Now we ſee no iſland in the Mediterranean wherein the marks whereby the Scripture deſcribes Caphtor and Cherethim agree better than in the iſle of Crete. The name *Cretim* or *Cherethim* is the ſame with that of *Cretenſes*. The Cretans are one of the moſt ancient and celebrated people which inhabited the iſlands of the Mediterranean. They pretended to have been produced originally out of their own ſoil. This iſland was well peopled in the time of the Trojan war. Homer calls it the iſland with a hundred cities. The city of Gaza in Paleſtine went by the name of *Minoa (Steph. Byzant. in Gaza)*, becauſe Minos king of Crete coming into that country, called this ancient city by his own name.

Herodotus acknowledges that the Cretans were originally all barbarians, and did not come from Greece. Homer ſays, that a different language was ſpoken in the iſle of Crete; that there were Greeks there, true or ancient Cretans, Pelaſgians, &c. The ancient Cretans are the ſame as the Cherethites, the Pelaſgians as the Philiſtines or Pelethites of the Scripture: their language was the ſame with that of the Canaanites or Phœnicians, that is, Hebrew: they were deſcended, as well as Canaan, from Ham, by Mizraim (Gen. x. 6, 13, 14.). The manners, arms, religion, and gods of the Cretans and Philiſtines were the ſame. The arms of the one and the other were bows and arrows. Dagon the god of the Philiſtines was the ſame as the Dictynna of the Cretans.

Whether theſe arguments are convincing, it is not for us to determine; but Wells does not think they are, as he is of the ſame opinion with the authors of the Univerſal Hiſtory, who ſay, that *Coptus*, the name of an old city of Egypt, is a corruption of the ancient *Caphtor*. It is not, however, of great importance to determine whether they came from Crete, from Cappadocia, or from Egypt: they had certainly been a conſiderable time in the land of Canaan, when Abraham arrived there in the year of the world 2083. They were then a very powerful people, were governed by kings, and in poſſeſſion of ſeveral conſiderable cities. The race of kings then in power were honoured with the title of *Abimelech*. This race, however, was but of ſhort duration; for their monarchy became an ariſtocracy of five lords, who were, as far as we can diſcover, partly independent of each other, though they acted in concert for the common cauſe. This form of government was again ſucceeded by another race of kings, diſtinguiſhed by the title of *Achiſh*, though they alſo bore that of *Abimelech*. The kings were always under great limitations. The Philiſtines appear to have been a very warlike people, induſtrious, and lovers of freedom; they did not circumciſe, and in the early periods of their hiſtory held adultery in the greateſt abhorrence. "Their character (ſay the authors of the Univerſal Hiſtory) muſt be conſidered at different periods; for we may ſay they were not always the ſame people. In the days of Abraham and Iſaac, they were without all doubt a righteous and hoſpitable nation: but afterwards a revolution in government, religion, and morals, may have enſued. From thenceforward they became like other idolatrous nations; the ſame enormities crept in and prevailed among them. They are conſtantly mentioned in Scripture as ſtrangers; and, though poſſeſſed of a very conſiderable part of the Land of Promiſe, yet God would never ſuffer them to be driven out, they being Egyptians by deſcent, and not original natives, whoſe land only was promiſed to Abraham and his ſeed. Their arrogance and ambition were great; and ſo irreconcileable was their enmity (A) to the Iſraelites, that one would be almoſt tempted to think they were created on purpoſe to be a thorn in their ſides; for though the hand of God was evidently againſt them ſeveral times, and particularly when they detained the ark, yet they hardened their hearts, and cloſed their eyes againſt conviction. They ſeem to have entertained a very fond veneration for their deities, in which they perſiſted, though they were eye witneſſes of the ſhame and ignominy which befel them in the preſence of the captive ark; nay, they were ſo biaſſed in their favour, as to imagine that their gods might prevail againſt Him who had in ſo glaring a manner put them to ſhame and diſgrace. They were much engaged in trade; which, conſidering their ſituation, they may have exerciſed from the beginning; but, by the acceſſion of the fugitive Edomites in David's time, they roſe to ſo great a reputation as merchants, that the Greeks, it ſeems, preferred them to all other nations in that reſpect, and from them called all the country bordering on theirs *Paleſtine*. Their language was not ſo different from that ſpoken by the Hebrews as to cauſe any difficulty for them to converſe together, as will be perceived by their intercourſe with Abraham and Iſaac; ſo that, in all this region, the ſeveral nations ſpoke one and the ſame tongue, perhaps with ſome variation of dialect. They had doubtleſs the arts and ſciences in common with the moſt learned and ingenious among their contemporaries, and perhaps ſome of them in greater perfection. They had giants among them; but whether they were originally of the breed of the Anakims, who retired hither when they were expelled from Hebron, or were ſprung from accidental births, is not eaſily determined. We muſt not forget, that the invention of the bow and arrow is aſcribed to this people.

Anc. part, vol. i. p. 408, &c.

"Their religion was different at different times; under their firſt race of kings, they uſed the ſame rites with the Hebrews. Abimelech, in the ſin he had like to have committed with Sarah, through Abraham's timidity, was favoured with a divine admonition from God; and, by his ſpeech and behaviour at that time, it ſeems as if he had been uſed to converſe with the Deity. In after-times, they fell into endleſs ſuperſtitions, and different kinds of idolatry; each of the principal or five cities ſeemed to have an idol of its own. Marna, Marnas, or Marnaſh, was worſhipped at Gaza, and is ſaid to have migrated into Crete, and to have become the Cretan Jupiter. Dagon was worſhipped at Azotus; he ſeems to have been the greateſt, the moſt ancient, and moſt

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(A) "From a paſſage in Chronicles, it is gueſſed to have been of very ancient date; where it is ſaid, that 'the men of Gath ſlew the children of Ephraim, who would have taken their cattle from them.' This incident is nowhere elſe to be found; and there are various notions concerning the ſenſe in which we muſt take this paſſage. As to the time of the tranſaction, moſt people allow it to have been while the children of Iſrael were ſojourners in Egypt. It plainly appears, by the next verſe, that Ephraim himſelf was living at that period. The Targum ſuppoſes his children miſcomputed the time they were to ſerve in Egypt, and began too early an attempt upon their Promiſed Land."

Philiſtines moſt favourite god they had; to which may be added, that he perhaps ſubſiſted the longeſt of any that did not ſtraggle out of the country. To him they aſcribed the invention of bread-corn, or of agriculture, as his name imports. We cannot enter into the common notion of his being repreſented as a monſter, half man half fiſh; nor conſequently into another, almoſt as common, that he is the ſame with the Syrian goddeſs Derceto, who, we are told, was repreſented under ſome ſuch mixed form. Our opinion is, that this idol was in ſhape wholly like a man; for we read of his head, his hands, and his feet. He ſtood in a temple at Azotus, and had prieſts of his own who paid him a very conſtant attendance. Next to Dagon was Baalzebub the god of Ekron. In the text of the New Teſtament he is called *Beelzebub*, and the *prince of devils*. His name is rendered *lord of flies*; which by ſome is held to be a mock appellation beſtowed on him by the Jews; but others think him ſo ſtyled by his worſhippers, as Hercules Apomyios, and others, were, from his driving thoſe inſects away; and urge, that Ahaziah, in his ſickneſs, would ſcarcely have applied to him, if his name had carried in it any reproach. But it muſt be remembered, it is the ſacred hiſtorian that makes uſe of that contemptuous term in deriſion; whereas the idolatrous monarch, who was one of his votaries, might call him by his common name, ſuppoſed to have been *Baal-zebaoth*, 'the lord of armies,' or *Baal-ſhamim*, 'lord of heaven,' or ſome other bordering on Baal-zebub. How, or under what form he was repreſented is uncertain: ſome place him on a throne, and attire him like a king; others paint him as a fly. Not to dwell on this obſcurity, it appears that he became an oracle of the higheſt repute for omniſcience and veracity; that he had prieſts of his own; and that he, in the middle times at leaſt, was much ſought after by thoſe who were anxious about futurity. Derceto we take certainly to have been the goddeſs of Aſcalon; but we are ſupported by profane authority, without the leaſt countenance from Scripture. Gath is ſeemingly the only city of all the five unprovided with a deity; wherefore, as the Scripture declares, that Aſhtaroth, or Aſtarte, was worſhipped by this people, we are ready to place her at Gath, and the rather, as this of all their cities may have had moſt communication with Sidon. To ſpeak in general concerning their religious rites and ceremonies, which is all we can do, they ſeem to have erected very large and ſpacious temples, or very wide halls, for the celebration of their ſolemn ſeaſons and feſtivals (for ſuch they ſurely had); their religious offices were attended with much pomp, and a great concourſe from all parts; and they preſented their gods with the chief part of their ſpoil, and carried them about with them when they went to war. We do not find in Scripture that they ſacrificed their children; and yet the Curetes (B) are ſaid to be their deſcendants."

With reſpect to the hiſtory of this extraordinary people, we find from the above extract, that they were not comprehended in the number of nations devoted to extermination, and whoſe territory the Lord had abandoned to the Hebrews; nor were they of the curſed ſeed of Canaan. However, Joſhua did not forbear to give their lands to the Hebrews, and to ſet upon them by command from the Lord, because they poſſeſſed a country which was promiſed to the people of God (Joſh. xv. 45,—47. and xiii. 2, 3.). But theſe conqueſts of Joſhua muſt have been ill maintained, ſince under the Judges, under Saul, and at the beginning of the reign of David, the Philiſtines oppreſſed the Iſraelites. True it is, Shamgar, Samſon, Samuel, and Saul, made head againſt them, but did not reduce their power; and they continued independent down to the reign of David, who ſubjected them to his government.

They continued in ſubjection to the kings of Judah down to the reign of Jehoram, ſon of Jehoſhaphat; that is, for about 246 years. However, Jehoram made war againſt them, and probably reduced them to his obedience again; becauſe it is obſerved in Scripture, that they revolted again from Uzziah; and that this prince kept them to their duty during the time of his reign (2 Chron. xxi. 16. and xxvi. 6, 7.). During the unfortunate reign of Ahaz, the Philiſtines made great havoc in the territories of Judah; but his ſon and ſucceſſor Hezekiah ſubdued them (2 Chron. xxviii. 18. and 2 Kings xviii. 8.). Laſtly, they regained their full liberty under the latter kings of Judah; and we may ſee by the menaces denounced againſt them by the prophets Iſaiah, Amos, Zephaniah, Jeremiah, and Ezekiel, that they brought a thouſand hardſhips and calamities upon the children of Iſrael: for which cruelties God threatened to puniſh them. Eſarhaddon beſieged Aſhdod or Azoth, and took it (Iſa. xx. 1.). And according to Herodotus, Pſammeticus king of Egypt took the ſame city, after a ſiege of 29 years. There is great probability, that Nebuchadnezzar, when he ſubdued the Ammonites, Moabites, Egyptians, and other nations bordering upon the Jews, reduced alſo the Philiſtines. After this, they fell under the dominion of the Perſians; then under that of Alexander the Great, who deſtroyed the city of Gaza, the only city of Phœnicia that durſt oppoſe him. After the perſecution of Antiochus Epiphanes, the Aſmonæans ſubjected under their obedience ſeveral cities of the Philiſtines; and Tryphon gave to Jonathan Maccabæus the government of the whole coaſt of the Mediterranean, from Tyre as far as Egypt, which included all the country of the Philiſtines.

PHILLYREA, MOCK-PRIVET; a genus of plants belonging to the diandria claſs. See BOTANY *Index*.

PHILO, an ancient Greek writer, was of a noble family among the Jews, and flouriſhed at Alexandria during the reign of Caligula. He was the chief of an embaſſy ſent to Rome about the year 42, to plead the cauſe of the Jews againſt Apion, who was ſent by the Alexandrians to charge them with neglecting the honours due to Cæſar. Caligula, however, would not allow him to ſpeak, and behaved to him in ſuch a manner that Philo

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(B) "The Curetes ſacrificed their children to Saturn; and from the ſimilitude this name bears to Cherethites or Philiſtines, it has been advanced that they are the ſame people; but as we have no warrant for ſaying the Philiſtines practiſed ſo barbarous and unnatural a cuſtom, we may venture to pronounce, that they learned it not from them, but borrowed it elſewhere."

Philo.

was in conſiderable danger of loſing his life. Others again tell us that he was heard; but that his demands were rejected. He afterwards went to Rome in the reign of Claudius; and there, Euſebius and Jerome inform us, he became acquainted with St Peter, with whom he contracted a friendſhip. Photius adds, that he became a Chriſtian, and afterwards, from ſome motive of diſcontent, renounced it. The account of this, however, is uncertain, for few believe that St Peter was at Rome in the reign of Claudius, if he ever was there at all.

Philo was educated at Alexandria, and made very great progreſs in eloquence and philoſophy. After the faſhion of the times, he cultivated, like many of his nation at Alexandria, the philoſophy of Plato, whoſe principles he ſo thoroughly imbibed, and whoſe manner he ſo well imitated, that it became a common ſaying, "Aut Plato philonizat, aut Philo platonizat." Joſephus ſays, he was a man "eminent on all accounts:" and Euſebius deſcribes him, "copious in ſpeech, rich in ſentiments, and ſublime in the knowledge of holy writ." He was, however, ſo much immerſed in philoſophy, particularly the Platonic, that he neglected the Hebrew language, and the rites and cuſtoms of his own people. Scaliger ſays, that Philo "knew no more of Hebrew and Syriac than a Gaul or a Scythian." Grotius is of opinion, that "he is not fully to be depended on, in what relates to the manners of the Hebrews:" and Cudworth goes further; for "though a Jew by nation (ſays he), he was yet very ignorant of Jewiſh cuſtoms." Fabricius thinks differently: for though he allows ſome inadvertencies and errors of Philo with regard to theſe matters, yet he does not ſee a ſufficient foundation on which to charge ſo illuſtrious a doctor of the law with ignorance. He allows, however, that Philo's paſſion for philoſophy had made him more than half a Pagan; for it led him to interpret the whole law and the prophets upon Platonic ideas; and to admit nothing as truly interpreted which was not agreeable to the principles of the academy. Beſides, this led him farther; he turned every thing into allegory, and deduced the darkeſt meanings from the plaineſt words. This moſt pernicious practice ORIGEN, it is known, imitated, and expoſed himſelf by it to the ſcoffs of Celſus and of Porphyry. Philo's writings abound with high and myſtical, new and ſubtile, far-fetched and abſtracted, notions; and indeed the doctrines of Plato and Moſes are ſo promiſcuouſly blended, that it is not an eaſy matter to aſſign to each his principles. There are certainly, however, in his works many excellent things. Though he is continually Platoniſing and allegoriſing the Scriptures, he abounds with fine ſentiments and leſſons of morality; and his morals are rather the morals of a Chriſtian than of a Jew. Hiſtory, together with his own writings, give us every reaſon to believe that he was a man of great prudence, conſtancy, and virtue.

His works were firſt publiſhed in Greek by Turnebus at Paris 1552. A Latin tranſlation made by Gelenius was afterwards added, and printed ſeveral times with it. The Paris edition of 1640 in folio was the beſt for a whole century; which made Cotelerius ſay, that "Philo was an author that deſerved to have a better text and a better verſion." In 1742, a handſome edition of his works was publiſhed at London by Dr Mangey in two volumes folio; which is certainly preferable if it were only for the paper and print, but it is not ſo good a one as Philo deſerves.

Philocles ‖ Philolaus.

Many of our readers may be deſirous of farther details reſpecting this celebrated man; we refer ſuch therefore to *Joſephus's Antiquities*, *Euſebius's Eccleſiaſtical Hiſtory*, St Jerome's work *De Scriptoribus Eccleſiaſticis*, *Fabricius Bibl. Græc. Cave Hiſt. Liter.* and vol. ii. of Monuments of the Greek Church.

PHILOCLES, an admiral of the Athenian fleet during the Peloponneſian war. He recommended to his countrymen to cut off the right hand of ſuch of the enemies as were taken, that they might be rendered unfit for ſervice. His plan was adopted by all the ten admirals except one; but their expectations were fruſtrated, and inſtead of being conquerors they were totally defeated at Ægoſpotamos by Lyſander, and Philocles was put to death with the reſt of his colleagues.

PHILOCTETES, in fabulous hiſtory, the ſon of Pæan, was the faithful companion of Hercules; who at his death obliged him to ſwear not to diſcover the place where his aſhes were interred, and preſented him with his arrows dipped in the Hydra's blood. The Greeks at the ſiege of Troy being informed by an oracle that they could never take that city without thoſe fatal arrows, went to Philoctetes, and inſiſted upon his diſcovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was intombed, by ſtamping upon the place: but he was puniſhed for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Machaon. He was afterwards taken by Ulyſſes to the ſiege of Troy, where he killed Paris with one of his arrows.

PHILOLAUS, of Crotona, was a celebrated philoſopher of antiquity, of the ſchool of Pythagoras, to whom that philoſopher's *Golden Verſes* have been aſcribed. He made the heavens his principal object of contemplation; and has been idly (A) ſuppoſed to have been the author of that true ſyſtem of the world which Copernicus afterwards revived. This made Bullialdus place the name of Philolaus at the head of two works, written to illuſtrate and confirm that ſyſtem.

Hiſt. of Philoſophy.

"He was (ſays Dr Enfield) a diſciple of Archytas, and flouriſhed in the time of Plato. It was from him that Plato purchaſed the written records of the Pythagorean ſyſtem, contrary to an expreſs oath taken by the ſociety of Pythagoreans, pledging themſelves to keep ſecret the myſteries of their ſect. It is probable, that among theſe books were the writings of Timæus, upon which Plato formed the dialogue which bore his name. Plutarch relates, that Philolaus was one of the perſons who eſcaped from the houſe which was burned by Cylon, during the life of Pythagoras; but this account cannot be correct. Philolaus was contemporary with Plato, and therefore certainly not with Pythagoras. Interfering

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(A) We ſay idly, becauſe there is undoubted evidence that Pythagoras learned that ſyſtem in Egypt. See PHILOSOPHY.

terfering in affairs of state, he fell a sacrifice to political jealousy.

"Philolaus treated the doctrine of nature with great ſubtlety, but at the ſame time with great obſcurity; referring every thing that exiſts to mathematical principles. He taught, that reaſon, improved by mathematical learning, is alone capable of judging concerning the nature of things; that the whole world conſiſts of infinite and finite; that number ſubſiſts by itſelf, and is the chain which by its power ſuſtains the eternal frame of things; that the Monad is not the ſole principle of all things, but that the Binary is neceſſary to furniſh materials from which all ſubſequent numbers may be produced; that the world is one whole, which has a fiery centre, about which the ten celeſtial ſpheres revolve, heaven, the ſun, the planets, the earth, and the moon; that the ſun has a vitreous ſurface, whence the fire diffuſed through the world is reflected, rendering the mirror from which it is reflected viſible; that all things are preſerved in harmony by the law of neceſſity; and that the world is liable to deſtruction both by fire and by water. From this ſummary of the doctrine of Philolaus it appears probable, that, following Timæus, whoſe writings he poſſeſſed, he ſo far departed from the Pythagorean ſyſtem as to conceive two independent principles in nature, God and Matter, and that it was from the ſame ſource that Plato derived his doctrine upon this ſubject."

PHILOLOGY.

1 Definition.

PHILOLOGY is compounded of the two Greek words φιλος and λογος, and imports "the deſire of inveſtigating the properties and affections of *words*." The ſages of Greece were, in the moſt ancient times, denominated Σοφοι, that is, *wiſe men*. Pythagoras renounced this pompous appellation, and aſſumed the more humble title of φιλοσοφος, that is, *a lover of wiſe men*. The learned Greeks were afterwards called *philoſophers*; and in proceſs of time, in imitation of this epithet, the word *philologer* was adopted, to import "a man deeply verſed in languages, etymology, antiquities, &c." Hence the term *philology*, which denotes the ſcience that we propoſe briefly to diſcuſs in the following article.

2 Objects and uſes of philology.

Though philology, in its original import, denoted only the ſtudy of words and language, it gradually acquired a much more extenſive, and at the ſame time a much more uſeful, as well as more exalted, ſignification. It comprehended the ſtudy of grammar, criticiſm, etymology, the interpretation of ancient authors, antiquities; and, in a word, every thing relating to ancient manners, laws, religion, government, language, &c. In this enlarged ſenſe of the word, philology becomes a ſcience of the greateſt utility; opens a wide field of intellectual inveſtigation; and indeed calls for a more intenſe exertion of induſtry, and multifarious erudition, than moſt of thoſe departments of literature which cuſtom hath dignified with more high-ſounding names. It is indeed apparent, that, without the aid of philological ſtudies, it is impoſſible, upon many occaſions, to develope the origin of nations; to trace their primary frame and conſtitution; to diſcover their manners, cuſtoms, laws, religion, government, language, progreſs in arts and arms; or to learn by what men and what meaſures the moſt celebrated ſtates of antiquity roſe into grandeur and conſideration. The ſtudy of hiſtory, ſo eminently uſeful to the legiſlator, the divine, the military man, the lawyer, the philoſopher, and the private gentleman who wiſhes to employ his learned leiſure in a manner honourable and improving to himſelf, and uſeful to his country, will contribute very little towards enlightening the mind without the aid of philological reſearches. For theſe reaſons we ſhall endeavour to explain the various branches of that uſeful ſcience as fully and as intelligibly as the nature of the preſent undertaking will permit.

3 Object of this article.

Moſt of the branches of philology have been already canvaſſed under the various heads of CRITICISM, ETYMOLOGY, GRAMMAR, LANGUAGE, &c. There ſtill remains one part, which has been either ſlightly touched upon, or totally omitted, under the foregoing topics: we mean, the nature and complexion of moſt of the oriental tongues; as alſo ſome of the radical dialects of the languages of the weſt. As we would willingly gratify our readers of every deſcription to the utmoſt of our power, we ſhall endeavour in this place to communicate to them as much information upon that ſubject as the extent of our reading, and the limits preſcribed one ſingle article, will permit.

Before we enter upon this ſubject, we muſt obſerve, that it is not our intention to fill our pages with a tedious, unintereſting, catalogue of barbarous languages, ſpoken by ſavage and inconſiderable tribes, of which little, or perhaps nothing, more is known than barely their names. Such an enumeration would ſwell the article without communicating one ſingle new idea to the reader's antecedent ſtock. We ſhall therefore confine our inquiries to ſuch languages as have been uſed in conſiderable ſtates and ſocieties, and which of conſequence have acquired a high degree of celebrity in the regions of the eaſt.

4 Variety of dialects before the deluge.

What was the antediluvian language, or whether it was divided into a variety of dialects as at this day, can only be determined by the rules of analogy; and these will lead us to believe, that whatever might have been the primitive language of mankind, if human nature was then conſtituted as it is at preſent, a great variety of dialects muſt of neceſſity have ſprung up in the ſpace of near 2000 years. If we adopt the Moſaic account of the antediluvian events, we muſt admit that the deſcendants of Cain for ſome ages lived ſeparated from thoſe of Seth. Their manner of life, their religious ceremonies, their laws, their form of government, were probably different, and theſe circumſtances would of courſe produce a variety in their language. The poſterity of Cain were an inventive race. They found out the art of metallurgy, muſic, and ſome think of writing; and in all probability many other articles [illegible] ſince the [illegible] and accommodation of life were the produce of their ingenuity. A people of this character muſt have paid no ſmall regard to their words and modes of expreſſion. Wherever muſic is cultivated, language will naturally be improved and refined. When new inventions are introduced, a new race of words and phraſes of neceſſity ſpring up, correſponding to the recent ſtock of ideas to be intimated. Beſides, among an inventive race of people, new vocables would be continually fabricated, in order to ſupply the deficiencies of the primitive language, which was probably ſcanty in words, and its phraſeology unpoliſhed. The Cainites, then, among their other improvements, cannot well be ſuppoſed to have neglected the cultivation of language. 5 [illegible] of Cain.

Many conjectures have been hazarded both by ancient and modern authors with reſpect to the origin of writing; an art nearly connected with that of ſpeaking. According to Pliny *, "the Aſſyrian letters had always exiſted; ſome imagined that letters had been invented by the Egyptian Mercury; others aſcribed the honour of the invention to the Syrians." The truth ſeems to be, that letters were an antediluvian invention, preſerved among the Chaldeans or Aſſyrians, who were the immediate deſcendants of Noah, and inhabited thoſe very regions in the neighbourhood of which the ark reſted, and where that patriarch afterwards fixed his reſidence. This circumſtance, we think, affords a ſtrong preſumption that the uſe of letters was known before the deluge, and tranſmitted to the Aſſyrians and Chaldeans by Noah their progenitor, or at leaſt by their immediate anceſtors of his family. If, then, the art of writing was an antediluvian invention, we think that in all probability it originated among the poſterity of Cain. 6 Origin of writing.

* *Nat. Hiſt.* lib. vii. cap. 56.

The deſcendants of Seth, according to the oriental tradition, were chiefly addicted to agriculture and tending of cattle. They devoted a great part of their time to the exerciſes of piety and devotion. From this circumſtance they came to be diſtinguiſhed by the title of the (A) *ſons of God*. According to this deſcription, the Sethites were a ſimple (B), unimproved race of people till they mingled with the race of Cain; after which period they at once adopted the improvements and the vices of that wicked family.

It is not, however, probable, that all the deſcendants of Seth, without exception, mingled with the Cainites. That family of which Noah was deſcended had not incorporated with the race of Cain: it was, according to the ſacred hiſtorian, lineally deſcended from Seth, and had preſerved the worſhip of the true God, when, it is probable, the greateſt part of mankind had apoſtatiſed and become idolaters (C). Along with the true religion, the progenitors of Noah had preſerved that ſimplicity of manners and equability of character which had diſtinguiſhed their remote anceſtors. Agriculture and rearing cattle had been their favourite occupations. Accordingly we find, that the patriarch Noah, immediately "after the deluge," became a huſbandman, and "planted a vineyard." The choſen patriarchs, who doubtleſs imitated their pious anceſtors, were ſhepherds, and employed in rearing and tending cattle. Indeed there are ſtrong preſumptions that the Chaldeans, Aſſyrians, Syrians, Canaanites, and Arabians, in the earlieſt ages followed the ſame profeſſion.

From this deduction, we imagine it is at leaſt probable, that the anceſtors of Noah perſiſted in the obſervance of the ſame ſimplicity of manners which had been handed down from Adam to Seth, and from him to Enoch, Methuſelah, Lamech, and from this laſt to Noah. According both to ſcripture and tradition, innovations were the province of the Cainites, while the deſcendants of Seth adhered to the primitive and truly patriarchal inſtitutions.

If theſe premiſes are allowed the merit of probability, we may juſtly infer that the language of Noah, whatever it was, differed very little from that of Adam (D); and that if it is poſſible to aſcertain the language of the former, that of the latter will of courſe be diſcovered. We ſhall then proceed to throw together a few obſervations relating to the language of Noah, and leave our readers to judge for themſelves. We believe it will be ſuperfluous to ſuggeſt, that our intention in the courſe of this deduction, is, if poſſible, to trace the origin and antiquity of the Hebrew tongue; and to try to diſcover whether that language, or any of its ſiſter dialects, may claim the honour of being the original language of mankind. 7 The original language preſerved in the family from which Noah ſprung.

Whatever may have been the dialect of Noah and his family, that ſame dialect, according to the Moſaic account, muſt have obtained, without any alteration, till the era of the building of the tower of Babel.—Upon this occaſion a dreadful convulſion took place: the language of mankind was confounded, and men were *ſcattered abroad upon the face of all the earth.*

How far this cataſtrophe (E) extended, is not the buſineſs of the preſent inquiry to determine. One thing is certain beyond all controverſy, namely, that the languages of all the nations which ſettled near the centre of population were but ſlightly affected by its influence. A very judicious writer has obſerved *, that 3000 years after, the inhabitants of thoſe countries exhibited a very ſtrong reſemblance of cognation, "in their *language*, manner 8 Confuſion at the tower of Babel.

* *Strabo.*

(A) From this paſſage (Gen. chap. vi. verſe 2.) miſunderſtood, originated the abſurd idea of the connection between angels and mortal women. See *Joſeph. Antiq. Jud.* lib. i. cap. 4. See *Euſeb. Chron.* lib. i. All the fathers of the church, almoſt without exception, adopted this fooliſh notion. See alſo *Philo Jud.* p. 198. edit. Turn. Paris 1552.

(B) The orientals, however, affirm, that Seth, whom they call *Edris*, was the inventor of aſtronomy.

(C) We think it highly probable that idolatry was eſtabliſhed before the flood; becauſe it prevailed almoſt immediately after that cataſtrophe. See POLYTHEISM.

(D) For the firſt language communicated to Adam, ſee the article on LANGUAGE; alſo *Schenckford's Connect.* vol. i. lib. ii. p. 111. *et ſeq.*

(E) Joſephus and the fathers of the church tell us, that the number of languages produced by the confuſion of tongues was 72; but this is a mere rabbinical legend.

History of manner of living, and the lineaments of their bodies. At the ſame time he obſerves, that the reſemblance in all thoſe particulars was moſt remarkable among the inhabitants of Meſopotamia." This obſervation, with reſpect to language, will, we doubt not, be vouched by every one of our readers who has acquired even a ſuperficial knowledge of the languages current in thoſe quarters at a very early period.

It appears, then, that the languages of the Armenians, Syrians, Aſſyrians, Arabians, and probably of the Chanaanim, did not ſuffer materially by the confuſion of tongues. This obſervation may, we imagine, be extended to many of the dialects (F) ſpoken by the people who ſettled in thoſe countries not far diſtant from the region where the ſacred hiſtorian has fixed the original ſeat of mankind after the deluge. The inference then is, that if Noah and his family ſpoke the original language of Adam, as they moſt probably did, the judgement which effected the confuſion of tongues did not produce any conſiderable alteration in the language of ſuch of the deſcendants of Noah as ſettled near the region where that patriarch had fixed his reſidence after he quitted the ark.

9 Only a part of mankind engaged in building the tower,

But ſuppoſing the changes of language produced by the cataſtrophe at the building of the tower as conſiderable as has ever been imagined, it does not, after all, appear certain, that all mankind, without exception, were engaged in this impious project. If this aſſertion ſhould be well founded, the conſequence will be, that there was a choſen race who did not engage in that enterpriſe. If there was ſuch a family, ſociety, or body of men, it will follow, that this family, ſociety, &c. retained the language of its great anceſtor without change or variation. That ſuch a family did actually exiſt, is highly probable, for the following reaſons.

1. We think there is reaſon to believe that Ham, upon the heavy curſe denounced upon him by his father *, retired from his brethren, and fixed his reſidence elſewhere. Accordingly we find his deſcendants ſcattered far and wide, at a very great diſtance from the Gordyæan mountains, where the ark is generally ſuppoſed to have reſted immediately after the flood. Some of them we find in Chaldæa, others in Arabia Felix, others in Ethiopia (G), others in Canaan, and others in Egypt; and, finally, multitudes ſcattered over all the coaſt of Africa. Between theſe countries were planted many colonies of Shemites, in Elam, Aſſyria, Syria, Arabia, &c. We find, at the ſame time, the deſcendants of Shem and Japhet ſettled, in a great degree, contiguous to each other. This diſperſion of the Hamites, irregular as it is, can ſcarce, we think, have been accidental; it muſt have been owing to ſome other cauſe, and none ſeems more probable than that aſſigned above. If, then, the deſcendants of Ham ſeparated early, and took different routes, as from their poſterior ſituations it appears they did, they could not all be preſent at the building of the tower.

* Gen. ix. 25.

10 [illegible]

2. It is not probable that the deſcendants of Shem were engaged in this undertaking, ſince we find that they were not *ſcattered abroad upon the face of all the earth*. The children of Shem were † Elam, Aſhur, Arphaxad, Lud, and Aram. Elam ſettled near the mouth of the river Tigris, in the country which, by the Gentile writers, was called *Elymais*. Above him, on the ſame river, lay the demeſne of Aſhur, on the weſtern ſide. In like manner, upon the ſame river, above him, was ſituated Aram, who poſſeſſed the country of Aramea; and oppoſite to him was Arphaxad, or Arbáces, or Arbaches, and his country was denominated *Arphachites*. Lud, as ſome think, ſettled in Lydia, among the ſons of Japhet; but this opinion ſeems to be without foundation (H). Here, then, there is a diſperſion, but ſuch as muſt have originated from the nature of the thing. The four, or rather the five brothers, all ſettled contiguous, without being *ſcattered abroad upon the face of the whole earth*. Beſides, there was no confuſion of language among theſe tribes: they continued to uſe one and the ſame *lip* through many ſucceeding generations.

† Gen. x. 22.

11 The language of Adam preſerved in the family of Shem.

From theſe circumſtances it appears that the poſterity of Shem were not involved in the guilt of the builders of the tower, and of conſequence did not undergo their puniſhment. If then the language of the Shemites was not confounded upon the erection of the tower, the preſumption is, that they retained the language of Noah, which, in all probability, was that of Adam. Some dialectical differences would in proceſs of time creep in, but the radical fabric of the language would remain unaltered.

3. The poſterity of Shem appear in general to have cultivated the paſtoral life. They imitated the ſtyle of living adopted by the antediluvian poſterity of Seth. No ſooner had Noah deſcended from the ark, than he became *Iſh ha Adamah*, a man of the earth; that is, a huſbandman, and planted a vineyard. We find that ſome ages after, Laban the Syrian had flocks and herds; and that the chief wealth of the patriarch Abraham and his children conſiſted in their flocks and herds. Even his Gentile deſcendants, the Iſhmaelites and Midianites, ſeem to have followed the ſame occupation. But people of this profeſſion are ſeldom given to changes: their wants are few, and of conſequence they are under few or

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(F) The languages of the Medes, Perſians, Phœnicians, and Egyptians, very much reſembled each other in their original complexion; and all had a ſtrong affinity to the Hebrew, Chaldean, Syriac, &c. See Walton's *Proleg.*; Gale's *Court of the Gent.* vol. i. lib. i. ch. 11. p. 70. *et ſeq.*; Boch. *Phaleg* and *Chanaan, paſſ.* To theſe we may add the Greek language, as will appear more fully below.

(G) Joſephus informs us, that all the nations of Aſia called the Ethiopians *Cuſhim*, lib. i. cap. 7.

(H) The ancient name of Lydia was *Mæonia*. See Strabo *Caſaub.* lib. xiii. p. 586. chap. 7. *Rhod.* 577. The Lydians were celebrated for inventing games; on which account they were nicknamed by the Æolian Greeks Λυδοι, *Lydi* or *Ludi*, from the Hebrew word *lutz*, *ludere*, *illudere*, *deridere*. We find (Ezek. chap. xxvii. ver. 10.) the men of Elam and the men of Lud joined in the defence of Tyre; which ſeems to intimate, that the Elamites and Ludim were neighbours. If this was actually the caſe, then Lud ſettled in the ſame quarter with his brothers.

Language or no temptation to deviate from the beaten track. This circumſtance renders it probable, that the language of Noah, the ſame with that of Adam, was preſerved with little variation among the deſcendants of Arphaxad down to Abraham.

12 Derived to Abraham.

We have obſerved above, that Ham, upon the curſe denounced againſt him by his father, very probably left the ſociety of his other brothers, and emigrated elſewhere, as Cain had done in the antediluvian world. There is a tradition ſtill current in the Eaſt, and which was adopted by many of the Chriſtian fathers (I), that Noah, in the 930th year of his life, by divine appointment, did, in the moſt formal manner, divide the whole terraqueous globe among his three ſons, obliging them to take an oath that they would ſtand by the deciſion. Upon this happened a migration at the birth of Peleg, that is, about three centuries after the flood. It is affirmed that Nimrod the arch-rebel diſregarded this partition, and encroached upon the territory of Aſhur, which occaſioned the firſt war after the flood.

The Greeks had acquired ſome idea of this partition, which they ſuppoſed to have been between Jupiter ‡, Neptune, and Pluto. Plato ſeems to have heard of it (K): "For (ſays he) the gods of old obtained the dominion of the whole earth, according to their different allotments. This was effected without any contention, for they took poſſeſſion of their ſeveral provinces in a fair and amicable way, by lot." Joſephus §, in his account of the diſperſion of mankind, plainly intimates a divine deſtination; and Philo-Judæus (L) was of the ſame opinion before him.

‡ *Callimach. Hym.* *Hom. Iliad.* lib. xv.

§ *Ant. Jud.* lib. I. c. 5.

In conſequence of this arrangement, the ſons of Shem poſſeſſed themſelves of the countries mentioned in the preceding pages: the poſterity of Japhet had ſpread themſelves towards the north and weſt; but the Hamites, who had ſeparated from their brethren in conſequence of the curſe, not chooſing to retire to their quarters, which were indeed very diſtant from the place where the ark reſted, ſeized upon the land of Canaan (M). Perhaps, too, it might be ſuggeſted by ſome malicious ſpirits, that the aged patriarch was dealing partially when he aſſigned Ham and his poſterity a quarter of the world to inhabit not only remote from the centre of population, but likewiſe ſequeſtered from the reſt of mankind (N).

Be that as it may, the children of Ham removed eaſtward, and at length deſcending from the Carduchean or Gordyæan mountains, directed their courſe weſtward, and arrived at the plains of Shinar, which had been poſſeſſed by the Aſhurim ever ſince the era of the firſt migration at the birth of Peleg. The ſacred hiſtorian informs us, that the whole *earth* "was of one language and of one ſpeech;" that in journeying from the eaſt, they lighted upon the plain of Shinar, and dwelt there. In this paſſage we find no particular people ſpecified; but as we find Nimrod, one of the deſcendants of Ham, ſettled in that country, we are ſure that they were the offſpring of that patriarch. It would not, we think, be eaſy to aſſign a reaſon how one branch of the family of Ham came to plant itſelf in the midſt of the ſons of Shem by any other means but by violence.

13 The tower of Babel built by the children of Ham.

It is indeed generally ſuppoſed, that Nimrod, at the head of a body of the children of Ham, made war upon Aſhur, and drove him out of the country of Shinar; and there laid the foundation of that kingdom, the beginning of which was Babel: that this chief, ſupported by all the Cuſhites, and a great number of apoſtates from the families of Shem and Japhet who had joined him, refuſed to ſubmit to the divine ordinance by the mouth of Noah, with reſpect to the partition of the earth; and that he and his adherents were the people who erected the celebrated tower, in conſequence of a reſolution which they had formed to keep together, without repairing to the quarters aſſigned them by the determination of heaven. This was the crime which brought down the judgement of the Almighty upon them, by which they were *ſcattered abroad upon the face of all the earth.* The main body of the children of Shem and Japhet were not engaged in this impious undertaking; their language, therefore, was not confounded, nor were they themſelves ſcattered abroad. Their habitations were contiguous; thoſe of the Shemites towards the centre of Aſia; the dwellings of Japhet were extended towards the north and north-weſt; and the languages of both theſe families continued for many ages without the leaſt variation, except what time, climate, laws, religion, new inventions, arts, ſciences, and commerce, &c. will produce in every tongue in a ſucceſſion of years.

The general opinion then was, that none but the progeny of Ham and their aſſociates were preſent at the building of the tower, and that they only ſuffered by the judgement (O) conſequent upon that attempt. There are

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(I) *Epiph.* vol. i. p. 5. *ibid.* p. 709. where our learned readers will obſerve ſome palpable errors about *Rhinocorura*, &c. Euſeb. *Chron.* p. 10 Syncellus, p. 89. Cedrenus *Chron. Paſch.* &c.

(K) Critias, vol. iii. page 109. *Serr.* Apollodorus mentions a time when the gods reſpectively ſelected particular cities and regions, which they were to take under their peculiar protection.

(L) Lib. x. p. 236. Turn. Paris 1552. We have a plain alluſion to this diſtribution (Deut. ch. xxxii. ver. [illegible]). "When the moſt High divided to the nations their inheritance, when he ſeparated the ſons of Adam, he ſet the bounds of the people, according to the number of the children of Iſrael; for the Lord's portion is his people; Jacob is the lot of his inheritance." From this paſſage it appears, that the whole was arranged by the appointment of God, and that the land of Canaan was expreſsly reſerved for the children of Iſrael. St Paul, Acts ch. xvii. ver. 16. ſpeaks of this divine arrangement, "God made of one blood all nations of men, for to dwell on all the face of the earth; and determined the bounds of their habitation."

(M) The ark, according to the moſt probable accounts, reſted upon Mount Ararat in Armenia.

(N) We think it is by no means improbable that Noah, well knowing the wickedneſs of the family of Ham, and eſpecially their inclination to the idolatry of the antediluvians, might actually intend to ſeparate them from the reſt of mankind.

(O) Some learned men have imagined that this confuſion of language, which the Hebrew calls of *Lip*, was only a

Etymology.

are even among the Pagans some allusions to the division of the world among the three sons of Noah. Many of the learned have imagined that this patriarch was Saturn; and that his three sons were Jupiter, Neptune, and Pluto, as has been observed above.

* Euſeb. Chron.

Beroſus*, in his hiſtory of the Babylonians, informs us, that Noah, at the foot of Mount [illegible], where the ark reſted, gave his children their laſt inſtructions, and then vaniſhed out of ſight. It is now generally believed that the Xiſuthrus of Beroſus was Noah. Eupolemus†, another heathen writer, tells us, "that the city Babel was firſt founded, and afterwards the celebrated tower: both which were built by ſome of thoſe people who eſcaped the deluge. They were the ſame with thoſe who in after times were exhibited under the name of *giants*. The tower was at length ruined by the hand of the Almighty, and thoſe giants were ſcattered over the whole earth." This quotation plainly intimates, that according to the opinion of the heathen, only [illegible] of the Hamites, and their apoſtate aſſociates, were engaged in this daring enterpriſe.

† Euſeb. Præp. Ev. lib. 9.

Indeed it can never be ſuppoſed, that Shem, if he was alive at that period, as he certainly was, would cooperate in ſuch an attempt or impious undertaking. That devout patriarch, we trust, would rather employ his influence and authority to divert his deſcendants from an attempt which he knew was undertaken in contradiction to an expreſs ordinance of Heaven: and it is ſurely very little probable that Elam, Aſhur, Arphaxad, and Aram, would join that impious confederacy, in oppoſition to the remonſtrances of their father.

The building of the tower, according to the moſt probable chronology, was undertaken at a period ſo late, that *all mankind* could not poſſibly have concurred in the enterpriſe.

Many of the fathers were of opinion, that Noah ſettled in Armenia, the country where the ark reſted; and that his deſcendants did not leave that region for five generations‡, during the ſpace of 659 years. By this period the human race muſt have been ſo amazingly multiplied, that the plains of Shinar could not have contained them. According to the Samaritan Pentateuch, and the Septuagint verſion, Peleg was born in the 134th year of his father Eber. Even admitting the vulgar opinion, that the tower was begun to be built, and the diſperſion conſequent upon that event to have taken place at this era, the human race would have been by much too numerous to have univerſally concurred in one deſign.

‡ Epiph. Hæreſ. lib. 1.

From theſe circumſtances, we hope it appears that the whole maſs of mankind was not engaged in building the tower; that the language of all the human race was [illegible] the [illegible], who had [illegible].

We [illegible] been [illegible] given [illegible] from two [illegible] exiſting among [illegible] to [illegible] hiſtory; [illegible] readers, [illegible] may be [illegible] reſpecting the confuſion of languages, and the diſperſion of mankind, [illegible] and [illegible] that the language of Noah was [illegible].

To gratify that numerous body of our [illegible] readers who may not have acceſs to more ample information, we ſhall in this place exhibit a brief detail of the circumſtances which attended this bold attempt. The people engaged in it have been held up as a profligate race. The Almighty himſelf denominates them "*the children of men*," which is the very appellation by which the antediluvian ſinners were characterized: *the ſons of God and the daughters of men*, &c. Their deſign in raiſing this edifice was "*to make them a name, and to prevent their being ſcattered abroad upon the face of the whole earth**."

* Gen. xi. 4.

Whatever reſolution the reſt of mankind might take, they had determined to maintain themſelves on that ſpot. The tower was intended as a centre of union, and perhaps as a fortreſs of defence. Such a ſtupendous fabric, they imagined, would immortalize their memory, and tranſmit the name of their confederacy with eclat (P) to future ages. This deſign plainly intimates, that there was only a party concerned in the undertaking, ſince, had all mankind been engaged in it, the purpoſe would have been fooliſh and futile. Again, they intended, by making themſelves *a name*, to prevent their being ſcattered abroad upon the face of the earth. This was an act of rebellion in direct contradiction to the divine appointment, which conſtituted their crime, and brought down the judgement of Heaven upon their guilty heads. The conſequence of the confuſion of languages was, that the projectors left off to build (Q), and were actually ſcattered abroad, contrary to their intention.

15
Pagan traditions [illegible]

Abydenus, in his Aſſyrian annals, records, that the (R) "tower was carried up to heaven: but that the gods

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a temporary failure of pronunciation, which was afterwards removed. This they are led to conclude, from the agreement of the languages of theſe people in after times.

(P) Many fooliſh and abſurd notions have been entertained concerning this ſtructure. Some have imagined that they meant to take ſhelter there in caſe of a ſecond deluge: others, that it was intended for idolatrous purpoſes; others, that it was to be employed as an obſervatory. Its dimenſions have likewiſe been moſt extravagantly magnified. Indeed Strabo, lib. 16. mentions a tower of immenſe ſize remaining at Babylon in his time, the dimenſions of which were a ſtadium every way. This, however, ſeems to have been the remains of the temple of Bel or Belus.

(Q) For a deſcription of the tower, ſee the article Babel.

(R) See the Greek original of this quotation, Euſeb. Chron. lib. 1. page 13

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gods ruined it by ſtorms and whirlwinds, and overthrew it upon the heads of thoſe who were employed in the work, and that the ruins of it were called *Babylon*. Before this there was but one language ſubſiſting among men: but now there aroſe πολυθρουφωνα, *a manifold ſpeech*; and he adds, that a war ſoon after broke out between (S) Titan and Cronus." (T) The Sybilline oracles give much the ſame account of this early and important tranſaction.

"Juſtin *. informs us, that the Phœnicians who built Tyre were driven from Aſſyria by an earthquake. Theſe Phœnicians were the deſcendants of Mizraim the youngeſt ſon of Ham; and were, we think, confederates in building the tower, and were driven away by the cataſtrophe that enſued. Many other alluſions to the diſperſion of this branch of the family occur in Pagan authors, which the limits to be obſerved in an inquiry of this nature oblige us to omit. Upon the whole, we think it probable that the country of Shinar lay deſolate for ſome time after this revolution; for the dread of the judgement inflicted upon the original inhabitants would deter men from ſettling in that inauſpicious region. At laſt, however, a new colony arrived, and Babel, or Babylon, became the capital of a flouriſhing kingdom.

* *Philip.* lib. 18. cap. 3.

Our readers, we believe, will expect that we ſhould ſay ſomething of Nimrod the mighty hunter, who is generally thought to have been deeply concerned in the tranſactions of this period. According to moſt authors, both ancient and modern, this patriarch was the leader of the confederates who erected the tower, and the chief inſtigator to that enterpriſe. But if the tower was built at the birth of Pheleg, according to the Hebrew computation, that chief was † either a child, or rather not born at that period (U). The Seventy have pronounced him a giant, as well as a huntſman. They have tranſlated the Hebrew word *gebur*, which generally ſignifies *ſtrong*, *mighty*, by the word γιγας, *giant*; an idea which we imagine thoſe tranſlators borrowed from the Greeks. The antediluvian giants are called *Nephelim* and *Rephaim*, but never *Geburim*. The Rabbinical writers, who juſtly hated the Babylonians, readily adopted this idea (X); and the fathers of the church, and the Byzantine hiſtorians, have univerſally followed them. He has been called *Nimrod*, *Nebrod*, *Nymbroth*, *Nebroth*, and *Nebris*. Not a few have made him the firſt *Bacchus*, and compounded his name of *Bar*, a ſon, and *Cuſh*, that is, the ſon of *Cuſh*. Some have imagined that he was the Orion of the Pagans, whoſe ſhade is ſo nobly deſcribed by Homer ‡. But the etymology of this laſt name implies ſomething (Y) honourable, and very unſuitable to the idea of the *tyrant Nimrod*. It muſt be obſerved, however, that we find nothing in Scripture to warrant the ſuppoſition of his having been a tyrant; ſo far from it, that (Z) ſome have deemed him a benefactor to mankind. See NIMROD.

† *Bochar. Phaleg.* lib. 1. cap. 10.

‡ *Odyſſ.* l. 1. verſe 571.

The beginning of this prince's kingdom was Babel. Euſebius gives us firſt * a catalogue of ſix kings of the Chaldæans, and then another of five kings of Arabian extraction, who reigned in Chaldæa after them. This might naturally enough happen, ſince it appears that the inhabitants of thoſe parts of Arabia which are adjacent to Chaldea were actually Cuſhites, of the † ſame family with the Babylonians.

* *Chron.* lib. 1. page 14.

† Gen. x. Ezek. xxvii.

The Cuſhites, however, were at laſt ſubdued, perhaps partly expelled Chaldea by the *Chaſidim*, who probably claimed that territory as the patrimony of their progenitors. That the Chaſidim were neither *Cuſhites*, nor indeed *Hamites*, is obvious from the name. The Hebrews, and indeed all the Orientals ‡, denominated both the people who inhabited the eaſtern coaſt of Arabia *Cuſhim*, and alſo the Ethiopians who ſprung from the laſt mentioned people. Had the later inhabitants of Chaldea been the deſcendants of Cuſh, the Jewiſh writers would have called them *Cuſhim*. We find they called the Phœnicians *Chanaanim*, the Syrians *Aramim*, the Egyptians *Mizraim*, the Greeks *Jonim*, &c. The Chaſidim, therefore, or modern inhabitants of Chaldea, were poſitively deſcended of one Cheſed or Chaſed; but who this family-chief was, it is not eaſy to determine. The only perſon of that name whom we meet with in early times is the fourth ſon of Nahor §, the brother of Abraham; and ſome have been of opinion that the Chaldeans were the progeny of this ſame Cheſed. This appears to us highly probable, becauſe both Abram and Nahor were ‖ natives of *Ur* of the Chaſidim. The former, we know, in conſequence of the divine command, removed to *Haran*, afterwards *Charræ*; but the latter remained in *Ur*, where his family multiplied, and, in proceſs of time, became maſters of the country which they called the land of the Chaſidim, from *Cheſed* or *Chaſed*, the name of their anceſtor. This account is the more probable, as we find the other branches of Nahor's family ſettled in the ſame neighbourhood (A).

‡ *Joſeph. Ant.* lib. 1. cap. 6.

§ Gen. chap. xxii. verſe 22.

‖ Gen. chap. xi. verſe 28.

16
Origin of the name Chaldæi.

How the Greeks came to denominate theſe people Χαλδαιοι, *Chaldæi*, is a queſtion rather difficult to be reſolved; but we know that they always affected to diſtinguiſh people and places by names derived from their own language. They knew a rugged, erratic nation (B)

on

(S) This war was probably carried on between the leaders of the Hamites and Aſhur upon their invaſion.

(T) Theoph. ad Antol. lib. ii. page 107. ed. Paris 1636.

(U) Gen. chap. x. verſe 8, 9. "This man began to be a *giant* upon the earth; he was the giant hunter before the Lord God.—As Nymbrod the *giant* hunter before the Lord.

(X) See Mr Bryant's Analyſis, vol. iii. page 38. et ſeq.

(Y) Orion is compounded of the Hebrew *Or* "light," and *ion* "one of the names of the ſun;" and Orion was probably one of the names of that luminary.

(Z) See Shuckford's Connect. vol. i. lib. 3. page 179, 180. Alſo the authors of the Univer. Hiſt. vol. i.

(A) Huz gave name to the country of Job; Elihu, one of Job's friends, was a Buzite of the kindred of Ram or Aram, another of the ſons of Nahor. Aram, whoſe poſterity planted Syria cava, was the grandſon of Nahor by Kemuel. Hence it appears probable that Job himſelf was a deſcendant of Nahor by Huz his firſt born.

(B) See Euſtat. in Dion. Perieg. ver. 768. Strabo. lib. xii. page 543. Caſaub. As the Chalybes were famous for manufacturing iron, ſo were they celebrated for making the choiceſt pieces of armour. They excelled in making

χαλυζαναι,

on the banks of the river Thermodoon, in the territory of Pontus, bordering on Armenia the Leſs. Theſe, in ancient times, were called *Alybes* or *Chalybes*, becauſe they were much employed in forging and poliſhing iron. Their neighbours, at length, gave them the name of *Chald* or *Caled*, which imports, in the Armenian dialect, *fierce*, *hardy*, *robuſt*. This title the Greeks adopted, and out of it formed the word Χαλδαιοι "Chaldeans."

The Moſaic hiſtory informs us (c), that Aſhur went out of *that land* (Shinar), and built Nineveh and ſeveral other conſiderable cities. One of the ſucceſſors of Aſhur was the celebrated Ninus, who firſt broke the peace of the world *, made war upon his neighbours, and obliged them by force of arms to become his ſubjects, and pay tribute. Some authors make him the immediate ſucceſſor of Aſhur, and the builder of Nineveh. This we think is not probable; Euſebius, as we have obſerved above, gives a liſt of ſix Arabian princes who reigned in Babylon. Theſe we take to have been the immediate ſucceſſors of Nimrod, called *Arabians*; becauſe theſe people were Cuſhites. Ninus might be reputed the firſt king of the Aſſyrians, becauſe he figured beyond his predeceſſors; and he might paſs for the builder of Nineveh, becauſe he greatly enlarged and beautified that city. We therefore imagine, that Ninus was the fifth or ſixth in ſucceſſion after Aſhur.

Ninus, according to Diodorus Siculus †, made an alliance with Ariæus king of the Arabians, and conquered the Babylonians. This event, in our opinion, put an end to the empire of the Hamites or Cuſhim in Shinar or Babylonia. The author obſerves, that the Babylon which figured afterwards did not then exiſt. This fact is confirmed by the prophet Iſaiah ‡: "Behold the land of the Chaſidim; this people was not till Aſhur founded it for them that dwell in the wilderneſs. They ſet up the towers thereof, &c." After Babylonia was ſubdued by the Aſſyrians under Ninus, the capital was either deſtroyed by that conqueror or deſerted by the inhabitants. At length it was re-edified by ſome one or other of the Aſſyrian monarchs, who collected the roving Chaſidim, and obliged them to ſettle in the new city. Theſe were ſubject to the Aſſyrian empire till the reign of Sardanapalus, when both the Medes and Babylonians rebelled againſt that effeminate prince.

The Chaſidim were celebrated by all antiquity for their proficiency in aſtronomy, aſtrology, magic, and curious ſciences. Ur or Orchoe (D) was a kind of univerſity for thoſe branches of learning. Such was their reputation in thoſe ſtudies, that over a great part of Aſia and Europe a Chaldean and an aſtrologer were ſynonymous terms. Theſe ſciences, according to the tradition of the Orientals, had been invented by Seth, whom they call *Edris*; and had been cultivated by his deſcendants downward to Noah, by whom they were tranſmitted to Shem, who conveyed them to Arphaxad and his poſterity.

To us it appears probable, that the religious ſentiments tranſmitted from Noah through the line of Shem, were kept alive in the family of Arphaxad, and ſo handed down to the families of Serug, Nahor, Terah, Abram, Nahor II. and Haran, &c. The Jewiſh rabbis, and all the Perſian and Mahomedan writers, make Abraham contemporary with Nimrod; who, ſay they, perſecuted him moſt cruelly for adhering to the true religion. That theſe two patriarchs were contemporary, is very improbable, ſince Nimrod was the third generation after Noah, and Abram the tenth. Abram has been inveſted by the rabbinical writers with every department of learning. According to them, he tranſported from Charræ into Chanaan and Egypt, aſtronomy, aſtrology, mathematics, geography, magic, alphabetical writing, &c. &c.

17
Legendary tales concerning Abraham.

After the Babyloniſh captivity, when the Jews were diſperſed over all the eaſt, and began to make *proſelytes of the gate* among the Pagans, wonderful things were reported of Abram with reſpect to his acquirements in human erudition, as well as his ſupereminence in virtue and piety. Theſe legendary tales were believed by the proſelytes, and by them retailed to their connections and acquaintances. But certainly the holy man either was not deeply verſed in human ſciences, or did not deem them of importance enough to be communicated to his poſterity; ſince the Jews are, on all hands, acknowledged to have made little progreſs in theſe improvements. To think of raiſing the fame of Abraham, by claſſing him with the philoſophers, betrays an extreme defect in judgement. He is entitled to praiſe of a higher kind; for he excelled in piety, was the father of the faithful, the root of the Meſſiah, and the friend of God. Before theſe, all other titles vaniſh away. Such of our readers, however, as have leiſure enough, and at the ſame time learning enough to enable them to conſult the rabbinical legends, will be furniſhed with a full and ample de-

* Juſtin. lib. i. cap. 1.

† Lib. ii.

‡ Ch. xxxii. verſe 13.

κλιβανοι, or coats of mail, or brigandines uſed by the braveſt of the Perſian horſemen. Bochart Phaleg. lib. iii. cap. 12. and 13. has proved that the word *Cheliba* ſignifies "ſcales of braſs or ſteel." From the word *Cheliba*, the Greeks formed their Χαλυβοις, *Chalybes*. Xenoph. Cyrop. lib. iii. page 43. Steph. repreſents the Chaldeans, who inhabited a mountainous country bordering upon Armenia, as a very fierce warlike people. Ib. page 107. we have an example of their rapacious character. Id. ib. lib. iv. page 192. Hen. Steph. we have an account of their bravery and of their arms. Another inſtance of their rapacity occurs in their plundering the cattle of Job.

(c) A diſpute has ariſen about the ſenſe of verſe 10. chap. x. Out of that land went forth Aſhur, and builded Nineveh. Some approve our tranſlation, which we think is juſt; others, conſidering that the inſpired writer had been ſpeaking of Nimrod and the beginning of his kingdom, are of opinion that it ſhould be tranſlated, And out of this land *He* (that is Nimrod) went into Aſhur and builded Nineveh. This they make a military expedition, and a violent irruption into the territory of Aſhur.

(D) Ur or Orchoe was ſituated between Niſibis and Corduena. See Ammianus Marcel. Expeditio Juliana, lib. xv. It lay not far from the river Tigris. Strabo, lib. xvi. page 739, tells us that the Chaldean philoſophers were divided into different ſects, the Orcheni, the Borſippeni, and ſeveral others. Diod. Sicul. likewiſe, lib. ii. page 82. Steph. gives an exact detail of the functions, profeſſion, and eſtabliſhment of the Chaldeans, to which we muſt refer our curious readers.

Hiſtory of

tail of his imaginary exploits and adventures. Others, who are either not willing or not qualified to peruſe the writings of the rabbies, may conſult Dr Hyde* de Relig. vet. Perſ. and the authors of the Univerſal Hiſtory†, where they will find materials ſufficient to gratify their curioſity. We ſhall only obſerve, in addition to what we have already ſaid, that the Perſians, Chaldeans, and Arabians, pretended that their religion was that of Abraham: that honourable mention is made of him in the Koran: and that the name of Abraham or Ibrahim was celebrated over all the eaſt. See Abraham.

* Chap. ii.

† Vol. I.

In the progreſs of this diſſertation, we have ſeen that the language of Noah was, in all probability, the ſame or nearly the ſame with that of Adam. Additions and improvements might be introduced, but ſtill the radical ſtamina of the language remained unchanged. It has likewiſe, we hope, appeared, that the confuſion of language at the building of the tower of Babel was only partial, and affected none but the rebellious crew of the race of Ham, and the apoſtate part of the families of Shem and Japhet. We have concluded, that the main body of the race of Shem, at leaſt, were neither diſperſed nor their language confounded: and that conſequently the deſcendants of that patriarch continued to ſpeak their primeval dialect or the uncorrupted language of Noah. To theſe arguments we may take the liberty to add another, which is, that in all probability the worſhip of the true God was preſerved in the line of Arphaxad, after the generality of the other ſects had lapſed into idolatry. Out of this family Abraham was taken, in whoſe line the true religion was to be preſerved. Whether Abraham was an idolater when he dwelt in Chaldea, the ſcripture does not inform us, though it ſeems to be evident that his father was. One thing, however, is certain, namely, that Jehovah (E) appeared to him, and pronounced a bleſſing upon him before he left Ur of the Chaldees. This circumſtance no doubt indicates, that this patriarch had made uncommon advances in piety and virtue, even prior to his emigration. The progenitors of his family had been diſtinguiſhed by adhering to the true religion. About this time, however, they began to degenerate, and to adopt the Zabiiſm of their apoſtate neighbours. It was then that Abraham was commanded by Heaven to "leave his kindred and his father's houſe, and to travel into a land which was to be ſhown him." The Almighty intended that the true religion ſhould be preſerved in his line, and therefore removed him from a country and kindred, by the influence of whoſe bad example his religious principles might be endangered. His family had only of late apoſtatized; till that period they had preſerved both the language and religion of their venerable anceſtors.

18
The Hebrew and Chaldean originally the ſame, and the firſt language ſpoken on earth.

But however much Abraham might differ from the other branches of his family in his religious ſentiments, his language was certainly in uniſon with theirs. The conſequence of this unqueſtionable poſition is, that the language which he carried with him into Chanaan was exactly the ſame with that of his family which he relinquiſhed when he began his peregrinations. But if this be true, it will follow, that the language afterwards denominated Hebrew, and that of the Chaldeim or Chaldeans were originally one and the ſame. This poſition, we think, will not be controverted. There is then an end of the diſpute concerning the original language of mankind. We have aſſumed ſome plauſible proofs in the preceding pages, that the language of Adam was tranſmitted to Noah, and that the dialect of the latter was preſerved in the line of Arphaxad downwards to the family of Abraham: and it now appears that the Hebrew and Chaldean were originally ſpoken by the ſame family, and of courſe were the ſame between themſelves, and were actually the firſt language upon earth, according to the Moſaic hiſtory. Numberleſs additions, alterations, improvements, we acknowledge, were introduced in the courſe of 2000 years; but ſtill the original ſtamina of the language were unchanged. Our readers will pleaſe to obſerve that the Orientals are not a people given to change; and that this character, in the earlieſt ages, was ſtill more prevalent than at preſent. This aſſertion we preſume, needs no proof.

Language.

In confirmation of theſe preſumptive arguments, we may add the popular one which is commonly urged upon this occaſion, viz. that the names of antediluvian perſons and places mentioned by the ſacred hiſtorian, are generally of Hebrew original, and ſignificant in that language. Some of them, we acknowledge, are not ſo; but in this caſe it ought to be remembered, that a very ſmall part of that language now exiſts, and that probably the radicals from which theſe words are deſcended are among the number of thoſe which have long been loſt.

Sect. I. *The Hebrew Language.*

19
Character of the Hebrew language.

Having thus proved the priority of the Hebrew to every other language that has been ſpoken by men, we ſhall now proceed to conſider its nature and genius; from which it will appear ſtill more evidently to be an original language, neither improved or debaſed by foreign idioms. The words of which it is compoſed are ſhort, and admit of very little flexion. The names of places are deſcriptive of their nature, ſituation, accidental circumſtances, &c. Its compounds are few, and inartificially joined together. In it we find few of thoſe artificial affixes which diſtinguiſh the other cognate dialects; ſuch as the Chaldean, Syrian, Arabian, Phœnician, &c. We find in it no traces of improvement from the age of Moſes to the era of the Babyloniſh captivity. The age of David and Solomon was the golden period of the Hebrew tongue: and yet, in our opinion, it would puzzle a critic of the niceſt acumen to diſcover much improvement even during that happy era. In fact, the Jews were by no means an inventive people. We hear nothing of their progreſs in literary purſuits; nor do they ſeem to have been induſtrious in borrowing from their neighbours. The laws and ſtatutes communicated by Moſes were the principal objects of their ſtudies. Theſe they were commanded to contemplate day and night; and in them they were to place their chief delight. The conſequence of this command was, that little or no regard could be paid to taſte, or any other ſubject

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(E) Compare Gen. chap xii. ver. 2. with Acts, chap. vii. verſe 4.

Hebrew Language.

fubject of philofophical inveftigation. Every unimproved language abounds in figurative expreffions borrowed from fenfible objects. This is in a peculiar manner the characteriftic of the language in queftion; of which it would be fuperfluous to produce inftances, as the fact muft be obvious even to the attentive reader of the Englifh Bible.

In the courfe of this argument, we think it ought to be obferved, and we deem it an obfervation of the greateft importance, that if we compare the other languages which have claimed the prize of originality from the Hebrew with that dialect, we fhall quickly be convinced that the latter has a juft title to the preference. The writers who have treated this fubject, generally bring into competition the Hebrew, Chaldean, Syrian, and Arabian. Some one or other of thefe has commonly been thought the original language of mankind. The arguments for the Syrian and Arabian are altogether futile. The numerous improvements fuperinduced upon thefe languages, evidently prove that they could not have been the original language. In all cognate dialects, etymologifts hold it as a maxim, that the leaft improved is likely to be the moft ancient.

We have obferved above, that the language of Abraham and that of the Chefdim or Chaldeans were originally the fame; and we are perfuaded, that if an able critic fhould take the pains to examine ftrictly thefe two languages, and to take from each what may reafonably be fuppofed to have been improvements or additions fince the age of Abraham, he will find intrinfic evidence fufficient to convince him of the truth of this pofition. There appear ftill in the Chaldean tongue great numbers of (F) words the fame with the Hebrew, perhaps as many as mankind had occafion for in the moft early age; and much greater numbers would probably be found if both languages had come down to us entire.

20 How it was changed into what is called the Chaldean.

The conftruction of the two languages is indeed fomewhat different; but this difference arifes chiefly from the fuperior improvement of the Chaldean. While the Hebrew language was in a manner ftationary, the Chaldean underwent progreffive improvements; was mellowed by antithefes, rendered fonorous by the difpofition of vocal founds, acquired a copioufnefs by compounds, and a majefty by affixes and prefixes, &c. In procefs of time, however, the difference became fo great, that the Ifraelites did not underftand the Chaldean language at the era of the Babylonifh captivity. This much the prophet * intimates, when he promifes the pious Jews protection "from a fierce people; a people of a deeper fpeech than they could perceive; of a ftammering tongue, that they could not underftand."

* Ifaiah, ch. xxxiii. verfe 19.

The priority of the Chaldean tongue is indeed contended for by very learned writers. [illegible] † calls it the mother of all languages; and moft of the fathers were of the fame opinion. Amira ‡ has made a collection of arguments, not inconfiderable, in favour of it; and Myricæus § after him, did the fame. Erpenius ‖, in his Oration for the Hebrew tongue, thought the argument for it and the Chaldean fo equal, that he did not choofe to take upon him to determine the queftion.

† Brit.

‡ Præf. ad Gram. Syr.

Hebrew language.

[illegible]

Many circumftances, however, concur to make us affign the priority to the Hebrew, or rather to make us believe that it has fuffered leaft of thofe changes to which every living tongue is more or lefs liable. If we ftrip this language of every thing obvioufly adventitious, we fhall find it extremely fimple and primitive. 1. Every thing maforetical, fuppofing the vowels and points (G) effential, was certainly unknown in its original character. 2. All the prefixed and affixed letters were added time after time, to give more compafs and precifion to the language. 3. The various voices, moods, tenfes, numbers, and perfons of verbs, were pofterior improvements; for in that tongue, nothing at firft appeared but the indeclinable radix. 4. In the fame manner, the few adjectives that occur in the language, and the numbers and regimen of nouns, were not from the beginning. 5. Moft of the Hebrew nouns are derived from verbs; indeed many of them are written with the very fame letters. This rule, however, is not general; for often verbs are derived from nouns, and even fome from prepofitions. 6. All the verbs of that language, at leaft all that originally belonged to it, uniformly confift of three letters, and feem to have been at firft pronounced as monofyllables. If we anatomize the Hebrew language in this manner, we fhall reduce it to very great fimplicity; we fhall confine it to a few names of things, perfons, and actions; we fhall make all its words monofyllables, and give it the true characters of an original language. If at the fame time we reflect on the fmall number of (H) radical words in that dialect, we fhall be more and more convinced of its originality.

21 Arguments for maintaining the priority of the Hebrew.

It will not be expected that we fhould enter into a minute difcuffion of the grammatical peculiarities of this ancient language. For thefe we muft refer our readers to the numerous and elaborate grammars of that tongue, which are everywhere eafily to be found. We fhall only make a few ftrictures, which naturally prefent themfelves, before we difmifs the fubject.

The generality of writers who have maintained the fuperior antiquity of the Hebrew language, have at the fame time contended that all other languages of Afia, and moft of thofe of Europe, have been derived from that fource as their fource and matrix. We, for our part, are of opinion, that perhaps all the languages in the eaftern part of the globe were coeval with it, and were originally one and the fame; and that the differences which afterwards diftinguifhed them, fprung from climate, caprice, inventions, religions, commerce, con-

[illegible] guages in the eaft [illegible]

queſts,

(F) Moft of the Chaldean names mentioned in Scripture are pure Hebrew words compounded; fuch as *Nebuchadnezzar*, *Nebuzaradan*, *Rabfhakeh*, *Rabmag*, *Belfhazzar*, *Rabfaris*, [illegible] or [illegible], [illegible], &c. All thefe words, and a multitude of others which we could mention, are fo much of the Hebrew dialect, that their original is difcernible at firft fight. Moft of them are compounds, which the limits prefcribed us will not allow us to decompound and explain.

(G) The futility of thefe points will be proved in the following part of this fection.

(H) The radical words in the Hebrew language, as it now ftands, are about 500.

quests, and other accidental cauſes, which will occur to our intelligent readers. We have endeavoured to prove, in the preceding pages, that all mankind were not concerned in the building of the fatal tower, nor affected by the puniſhment conſequent upon that attempt: and we now add, that even that puniſhment was only temporary; ſince we find, that thoſe very Hamites or Cuſhim, who are allowed to have been affected by it, did certainly afterwards recover the former organization of their *lip*, and differed not more from the original ſtandard than the deſcendants of Japhet and Shem.

The Jewiſh rabbis have pretended to aſcertain the number of languages generated by the vengeance of Heaven at the building of Babel. They tell us that mankind was divided into 70 nations and 70 languages, and that each of theſe nations had its tutelar or guardian angel. This fabulous legend is founded on the number of the progeny of Jacob at the time when that patriarch and his family went down into Egypt. Others attribute its origin to the number of the ſons and grandſons of Noah, who are enumerated Gen. chap. x.

The fathers[*] of the church make the languages at the confuſion to amount to 72; which number they complete by adding Cainan and Eliſhah, according to the Septuagint, who are not mentioned in the Hebrew text. This opinion, they think, is ſupported by the words of Moſes, when he ſaith, that[†] "when the Moſt High divided to the nations their inheritance, when he ſeparated the ſons of Adam, he ſet the bounds of the people according to the number of the tribes of Iſrael." That is, ſay they, he divided them into 72 nations, which was the number of the children of Iſrael when they came into Egypt. The Targum of Ben-Uzziel plainly favours this interpretation; but the Jeruſalem Targum intimates that the number of nations was only 12, according to the number of the tribes of Iſrael. This paſſage, however, ſeems to refer to the tribes of the Chanaanim; and imports, that the Almighty aſſigned to the different ſepts of that family ſuch a tract of land as he knew would make a ſufficient inheritance for the children of Iſrael[‡]. Others have increaſed the different languages of the diſperſion to 120; but the general opinion has fixed them to 70 or 72. Our readers need ſcarce be put in mind that theſe opinions are futile and abſurd; neither founded in Scripture, profane hiſtory, or common ſenſe. At the ſame time, it muſt not be omitted, that according to Horapollo[§], the Egyptians held, that the world was divided into 72 habitable regions; and that, in conſequence of this tradition, they made the cynocephalus the emblem of the world, becauſe that in the ſpace of 72 days that animal pines away and dies.

23
Origin of the name *Hebrew.*

It has been made a queſtion, whether the Hebrew language was denominated from Heber the progenitor of Abraham, or from a word which in that tongue imports *over*, *beyond*. Moſt of the Chriſtian fathers, prior to St Origen, believed that both the Gentile name *Hebrew*, and the name of the language, were derived from the name of the patriarch; but that learned man imagined, that Abraham was called the *Hebrew*, not becauſe he was a deſcendant of Heber, but becauſe he was a transfluvianus, or from beyond the river Euphrates. The learned Bochart[*] has ſtrained hard to prove the former poſition; but to us his arguments do not appear deciſive. We are rather inclined to believe, that Abraham was called *Chibri*, (Hebrew), from the ſituation of the country from which he emigrated when he came to the country of Chanaan; and that in proceſs of time that word became a Gentile appellation, and was afterwards applied to his poſterity (1) often by way of reproach, much in the ſame manner as we ſay a *Northlander*, a *Norman*, a *Tramontane*, &c.

Here we may be indulged an obſervation, namely, that Abraham, a Hebrew, lived among the Chaldeans, travelled among the Chanaanites, ſojourned among the Philiſtines, lived ſome time in Egypt, and in all appearance converſed with all thoſe nations without any apparent difficulty. This circumſtance plainly proves, that all theſe nations at that time ſpoke nearly the ſame language. The nations had not yet begun to improve their reſpective dialects, nor to deviate in any great meaſure from the monoſyllabic tongue of the Hebrews. With reſpect to the language of Chanaan, afterwards the Phœnician, its ſimilarity to the Hebrew is obvious from the names of gods, men, cities, mountains, rivers, &c. which are the very ſame in both tongues, as might be ſhown in numberleſs caſes, were this a proper place for etymological reſearches.

Before we diſmiſs this part of our ſubject, we would wiſh to gratify our unlearned readers with a brief account of the Hebrew letters, and of the Maſoretical points which have been in a manner ingrafted on theſe letters. In the courſe of this deduction, we ſhall endeavour to follow ſuch authors as are allowed to have handled that matter with the greateſt acuteneſs, learning, and perſpicuity. If, upon any occaſion, we ſhould be tempted to hazard a conjecture of our own, it is cheerfully ſubmitted to the candour of the public.

24
Origin of alphabetic writing.

Much has been written, and numberleſs hypotheſes propoſed, with a view to inveſtigate the origin of *alphabetical writing*. To give even an abridged account of all theſe, would fill many volumes. The moſt plauſible, in our opinion, is that which ſuppoſes that the primary characters employed by men were the figures of material objects, analogous to thoſe of the Mexicans, ſo often mentioned by the authors who have written the hiſtory of that people at the era of the Spaniſh invaſion of their country. As this plan was too much circumſcribed to be generally uſeful, hieroglyphical figures were in proceſs of time invented as ſubſidiaries to this contracted orthography. In this ſcheme, we imagine, the proceſs was ſomewhat more extenſive. A *lion* might be ſketched, to import fierceneſs or valour; an *ox*, to denote ſtrength; a *ſtag*, to ſignify ſwiftneſs; a *hare*, to intimate timorouſneſs, &c.

The next ſtep in this proceſs would naturally extend to

[*] *Clem. Alex. Strom.* *Euſeb. Chron.* lib. i. *Epiphan. Hæreſ. Auguſt.* &c.

[†] Deut. chap. xxxii. verſe 8.

[‡] *Pacanini Epiſcop. Bercun. apud Hieron. in Catalogo Epiſt.* 22.

[§] 14. page 25. *Hoeſch.*

[*] *Phaleg*, b. i. c. 15.

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(1) The Egyptians might not eat bread with the Hebrews, for that is an abomination to the Egyptians. The Philiſtines (Samuel I. *paſſ.*) always call the Iſraelites *Hebrews* by way of reproach.

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to the inventing and appropriating of a few arbitrary characters, for repreſenting abſtract ideas, and other relations, which could not be well aſcertained by the methods above-mentioned. Theſe arbitrary ſigns might readily acquire a currency by compact, as money and medals do over a great part of the world.—Upon this plan we imagine the ancient Chineſe formed their language.

But neither the picture nor the hieroglyphic, nor the method of denoting *ideas* by arbitrary characters appropriated by compact, could ever have arrived at ſuch perfection as to anſwer all the purpoſes of ideal communication. The grand deſideratum then would be to fabricate characters to repreſent ſimple ſounds, and to reduce theſe characters to ſo ſmall a number as to be eaſily learned and preſerved in the memory. In this attempt the Chineſe have notoriouſly failed; their letters, or rather their characters, are ſo numerous, that few, if any, of their moſt learned and induſtrious authors, have been able to learn and retain the whole catalogue. Indeed thoſe people are not able to conceive how any combinations of 20 or 30 characters ſhould be competent to anſwer all the purpoſes of written language.

Many different nations have claimed the honour of this invention. The Greeks aſcribed it to the Phœnicians; and conſequently uſed the word φοινικιζειν *, *to act the Phœnician*, in the ſame ſenſe with αναγινωσκειν, *to read*; and conſequently the poet † aſcribes the invention to the ſame ingenious people. The Greeks borrowed their letters from the Phœnicians, and of courſe looked up to them as the inventors.

* *Heſych.*

† *Lucan.*

Others have attributed the invention to the Egyptians. That people aſcribed every uſeful and ingenious invention to their Thyoth, or Mercury Triſmegiſtus. Plato ſeems to have believed this tradition (K), and pretends to record a diſpute between the king of Egypt that then reigned and this perſonage, with reſpect to the influence that the art of alphabetic writing might poſſibly have upon the improvements of mankind in ſcience and liberal arts. Diodorus the Sicilian ‡ gives a ſimilar hiſtory of the ſame invention, but carries it back to the reign of Oſiris.

‡ *Bibl.* lib. i. page 10. Steph.

Pliny informs us ||, that Gellius attributed letters to the ſame Egyptian Mercury, and others to the Syrians; but that for "his part, he thought that the Aſſyrian letters were eternal." That learned Roman then imagined, that the Aſſyrian letters had exiſted at a period prior to all the records of hiſtory; which was in fact the caſe. By the Aſſyrian letters, he muſt mean the Chaldaic, and by the Syrian probably the Hebrew. The earlieſt Greek hiſtorians generally confound the Jews with the Syrians. Herodotus, enumerating the people who had * learned circumciſion from the Egyptians, mentions the Syrians of Paleſtine; and elſewhere he tells us, that Necho † beat the Syrians, and took Cadytis, a large and populous city belonging to that people. Hence it is evident that the Syrian alphabet, or the Syrian letters, were the ſame with the Hebrew. That the Aſſyrian or Chaldaic and Hebrew languages were the ſame, has, we hope, been fully proved already: that their letters were the ſame in the original ſtructure, can ſcarce be controverted. Theſe letters, we think, were antediluvian; whether, to uſe the expreſſion of Plato, they were dictated by ſome god, or fabricated by ſome man divinely inſpired. As this opinion may admit ſome diſpute, we ſhall take the liberty to ſubjoin our reaſons.

|| *Nat. Hiſt* lib. vii. c. 46.

* Lib. ii. c. 104.

† Ibid. c. 159.

25 Antediluvian.

1. It appears that the era of this invention is buried in impenetrable obſcurity. Had an invention of ſuch capital importance to mankind been made in the poſtdiluvian ages, we imagine the author would have been commemorated in the hiſtorical annals of the country where he lived (L).

2. The art of writing in alphabetical characters, according to the ſacred records, was practiſed at ſo early a period, that there was not a long enough interval between that and the deluge to give birth to that noble invention. If we conſider the ſtate of the world during ſome ages after that diſaſtrous event, we ſhall quickly be convinced that little reſpite could be found from the labour and induſtry indiſpenſably requiſite to provide the neceſſaries, and only a few of the conveniences, of life. Such a ſtate of things was certainly moſt unfavourable to the invention of thoſe arts and improvements which contribute nothing towards procuring the accommodations of life. The conſequence is obvious.

Moſes has recorded the hiſtory of the creation, of a few of the capital tranſactions of the antediluvian world, the birth, the age, the death, of the lineal deſcendants of Seth. He has preſerved the dimenſions of the ark, the duration of the univerſal deluge, its effects upon man and all terreſtrial animals, the population of the world by the poſterity of Noah, the age, &c. of the patriarchs of the line of Shem, from which his own anceſtors had ſprung. To this he has ſubjoined the petty occurrences which diverſified the lives of Abraham, Iſaac, and Jacob, and their deſcendants. Whence did the hiſtorian derive his information? We believe few of our readers will be ſo enthuſiaſtic as to imagine that the author received it from divine inſpiration. Tradition is a fallible guide; and in many caſes the accounts are ſo minutely preciſe, as to defy the power of that ſpecies of conveyance. The inſpired author muſt certainly have extracted his abridgement from written memoirs, or hiſtories of the tranſactions of his anceſtors regularly tranſmitted from the moſt early periods. Theſe annals he probably abridged, as Ezra did afterwards the hiſtory of the kings of Iſrael. If this was the caſe, as it moſt certainly was, the art of writing in alphabetical letters muſt have been known and practiſed many ages before Moſes. It has indeed been pretended, that the Jewiſh decalogue, inſcribed upon two tables of ſtone, was the very firſt ſpecimen of alphabetical writing. The arguments adduced in proof of this fact are lame and inconcluſive

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(K) See *Phædrus*, page 1240. See alſo page 374. *Phil.*

(L) It is true, the Egyptians attribute the invention to their Thoth, and the Phœnicians to their Hercules, or Melicerta or Baal; but theſe were only imaginary perſonages.

cluſive (M). Had that been the caſe, ſome notice muſt have been taken of ſo palpable a circumſtance. Moſes wrote out his hiſtory, his laws, and his memoirs; and it appears plainly from the text, that all the learned among his countrymen could read them. Writing was then no novel invention in the age of the Jewiſh legiſlator, but current and generally known at that era.

The patriarch Job lived at an earlier period. In that book we find many alluſions to the art of writing, and

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(M) The moſt ingenious and plauſible of thoſe arguments which have fallen under our obſervation, is given by Mr Johnſon vicar of Cranbrook, a writer of great learning and piety, who flouriſhed in the beginning of the 18th century, and whoſe works deſerve to be more generally known than we have reaſon to think they are at preſent. After endeavouring to prove that alphabetical writing was not practiſed before the era of Moſes, and expatiating upon the difficulty of the invention, this excellent ſcholar attempts to ſhow, that the original Hebrew alphabet was actually communicated to the Jewiſh legiſlator at the ſame time with the two tables of the law. "I know not (ſays he) any juſt cauſe why the law ſhould be *written by God*, or by an *angel* at his command, except it were for want of a man that could well perform this part. This could give no addition of authority to the law, eſpecially after it had been publiſhed in that aſtoniſhing and miraculous manner at Mount Sinai. The true writing of the original was indeed perfectly adjuſted, and preciſely aſcertained to all future ages, by God's giving a copy of it under his own hand; but this, I conceive, had been done altogether as effectually by God's dictating every word to Moſes, had he been capable of performing the office of an amanuenſis." The learned writer goes on to ſuppoſe, that it was for the purpoſe of *teaching Moſes the alphabet*, that God detained him forty days in the mount; and thence he concludes, that the Decalogue was the firſt writing in alphabetical characters, and that thoſe characters were a divine, and not a human invention.

It is always raſh, if not ſomething worſe, to conceive reaſons not aſſigned by God himſelf, for any particular tranſaction of his with thoſe men whom he from time to time inſpired with heavenly wiſdom. That it was *not* for the purpoſe of teaching Moſes the alphabet that God detained him forty days in the mount, when he gave him the two tables of the law, ſeems evident from his detaining him juſt as many days when he gave him the ſecond tables after the firſt were broken. If the legiſlator of the Jews had not been ſufficiently inſtructed in the art of reading during his firſt ſtay in the mount, he would have been detained longer; and it is not conceivable, that though in a fit of pious paſſion he was ſo far thrown off his guard as to break the two tables, his mind was ſo totally unhinged by the idolatry of his countrymen, as to forget completely an art which, by the ſuppoſition, the Supreme Being had ſpent *forty days* in teaching him! "But if Moſes could, at his firſt aſcent into the mount, perform the office of an amanuenſis, why are the original tables ſaid to have been written by the finger of God, and not by him who wrote the ſecond?" We pretend not to ſay why they were written by God rather than man; but we think there is ſufficient evidence, that by whomſoever they were written, the characters employed were of human invention. The Hebrew alphabet, without the Maſoretic points, is confeſſedly defective; and every man who is in any degree acquainted with the language, and is not under the influence of inveterate prejudice, will readily admit that thoſe points are no improvement. But we cannot, without impiety, ſuppoſe an art invented by infinite wiſdom, to fall ſhort of the utmoſt perfection of which it is capable: an alphabet communicated to man by God, would undoubtedly have been free both from defects and from redundancies; it would have had a diſtinct character for every ſimple ſound, and been at leaſt as perfect as the Greek or the Roman.

But we need not fill our pages with reaſonings of this kind againſt the hypotheſis maintained by Mr Johnſon. We know that "Moſes wrote all the words of the Lord," i. e. the ſubſtance of all that had been delivered in *Exod.* xx, xxi, xxii, xxiii. before he was called up into the mount to receive the tables of ſtone; nay, that he had long before been commanded by God himſelf to "write in a book" an account of the victory obtained over Amalek (*Exod.* xvii. 14.). All this, indeed, the learned writer was aware of; and to reconcile it with his hypotheſis, he frames another, more improbable than even that which it is meant to ſupport. "It is not unreaſonable (ſays he) to believe that God had written theſe tables of ſtone, and put them in Mount Horeb, from the time that by his angel he had there firſt appeared to Moſes; and that, therefore, all the time after, while he kept Jethro's ſheep thereabouts, he had free acceſs to thoſe tables, and peruſed them at diſcretion." But if belief ſhould reſt upon evidence, we beg leave to reply, that to believe all this would be in the higheſt degree unreaſonable; for there is not a ſingle hint in Scripture of the tables having been written at ſo early a period, or upon ſuch an occaſion, as God's firſt appearance to Moſes in the burning buſh. We know how reluctant Moſes was to go upon the embaſſy to which he was then appointed; and it is ſtrange, we think paſſing ſtrange, that when he records ſo faithfully his own backwardneſs, and the means made uſe of by God to reconcile him to the arduous undertaking, he ſhould make no mention of theſe important tables, if at that period he had known any thing of their exiſtence. Beſides all this, is it not wonderful, if Moſes had been practiſing the art of writing, as our author ſuppoſes, from the time of the burning buſh to the giving of the law, he ſhould then have ſtood in need of *forty days* teaching from God, to enable him to *read* with eaſe the firſt tables; and of other forty, to enable him to *write* the ſecond? This gives ſuch a mean view of the natural capacity of the Hebrew legiſlator, as renders the hypotheſis which implies it wholly incredible. See a *Collection of Diſcourſes*, &c. *in two volumes, by the reverend John Johnſon*, A. M. *vicar of Cranbrook in Kent.*

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and some paſſages which plainly prove its exiſtence. This ſhows that alphabetical characters were not confined to the choſen ſeed, ſince Job was in all probability a deſcendant of Huz, the eldeſt ſon of Nahor* the brother of Abraham. From this circumſtance, we think we may fairly conclude, that this art was known and practiſed in the family of Terah the father of Abraham.

* Gen. xxii. 20, &c.

3. There was certainly a tradition among the Jews in the age of Joſephus, that writing was an antediluvian invention‡. That hiſtorian pretends, that the deſcendants of Seth erected two pillars, the one of ſtone and the other of brick, and inſcribed upon them their aſtronomical obſervations and other improvements.—This legend ſhows that there did exiſt ſuch an opinion of the antiquity of the art of writing.

‡ Antiq. lib. i. c. 3.

26 Traditions to this purpoſe.

4. There muſt have been a tradition to the ſame purpoſe among the Chaldeans, ſince the writers who have copied from Beroſus, the celebrated Chaldean hiſtorian (o), ſpeak of alphabetical writing as a thing well known among the antediluvians. According to them, Oannes the Chaldean legiſlator gave his diſciples "an inſight into letters and ſcience. This perſon wrote concerning the generation of mankind, of their different genius and of civil polity, &c. Immediately before the deluge, they ſay, the god Cronus appeared to Siſithrus or Xiſuthrus, and commanded to commit to writing the beginning, improvement, and concluſion of all things down to the preſent term, and to bury theſe accounts ſecurely in the temple of the Sun at Seppara." All theſe traditions may be deemed fabulous in the main; but ſtill they evince that ſuch an opinion was current, and that though the uſe of letters was not indeed eternal (p), it was, however, prior to all the records of hiſtory; and of courſe, we think, an antediluvian diſcovery.

27 The original alphabet preſerved in the family of Noah.

This original alphabet, whatever it was, and however conſtructed, was, we think, preſerved in the family of Noah, and from it conveyed down to ſucceeding generations. If we can then diſcover the original Hebrew alphabet, we ſhall be able to inveſtigate the primary ſpecies of letters expreſſive of thoſe articulate ſounds by which man is in a great meaſure diſtinguiſhed from the brute creation. Whatever might be the nature of that alphabet, we may be convinced that the ancient Jews deemed it ſacred, and therefore preſerved it pure and unmixed till the Babyloniſh captivity. If, then, any monuments are ſtill extant inſcribed with letters prior to that event, we may reſt aſſured that theſe are the remains of the original alphabet.

There have, from time to time, been dug up at Jeruſalem, and other parts of Judea, ſeveral ancient coins and medals, inſcribed with letters of a form very different from thoſe ſquare letters in which the Hebrew Scriptures are now written.

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28 The ſame [illegible]

When the Samaritan Pentateuch was diſcovered (q), it evidently appeared that the inſcriptions on thoſe medals and coins were drawn in genuine Samaritan characters. The learned abbé Barthelemi, [illegible] * aſcertains "on the two medals of Tryphon and of Antiochus VII. one of the later Seleucidan princes, proves that all the inſcriptions on the coins and medals of Jonathan and Simon Maccabeus, and alſo on his, were invariably in the Samaritan character, down to the 95th year before the Chriſtian era."

* Mém. de [illegible] vol. [illegible]

It were eaſy to prove, from the Miſhna and Jeruſalem Talmud, that the Scriptures publicly read in the ſynagogues to the end of the ſecond century were written in the Samaritan character, we mean in the ſame character with the Pentateuch in queſtion. As the ancient Hebrew, however, ceaſed to be the vulgar language of the Jews after their return from the Babyloniſh captivity, the copies of the Bible, eſpecially in private hands, were accompanied with a Chaldaic paraphraſe; and at length the original Hebrew character fell into diſuſe, and the Chaldaic was ſubſtituted in its ſtead.

29 Which afterwards gave place to the Chaldaic.

It now appears that the letters inſcribed on the ancient coins and medals of the Jews were written in the Samaritan form, and that the Scriptures were written in the very ſame characters: we ſhall therefore leave it to our readers to judge whether (conſidering the implacable hatred which ſubſiſted between theſe two nations) it be likely that the one copied from the other; or at leaſt that the Jews preferred to the beautiful letters uſed by their anceſtors, the rude and inelegant characters of their moſt deteſted rivals. If, then, the inſcriptions on the coins and medals were actually in the characters of the Samaritan Pentateuch (and it is abſurd to ſuppoſe that the Jews borrowed them from the Samaritans), the conſequence plainly is, that the letters of the inſcriptions were thoſe of the original Hebrew alphabet, coeval with that language, which we dare to maintain was the firſt upon earth.

It may, perhaps, be thought rather ſuperfluous to mention, that the Samaritan coloniſts, whom the kings of Aſſyria planted in the cities of Samaria (r), were natives of countries where Chaldaic letters were current, and who were probably ignorant of the Hebrew language and characters. When thoſe coloniſts embraced the Jewiſh religion, they procured a copy of the Hebrew Pentateuch written in its native character, which, from ſuperſtition, they preſerved inviolate as they received it; and from it were copied ſucceſſively the others which were current in Syria and Paleſtine when Archbiſhop Uſher procured his.

(o) Apollodorus, Alexander Polyhiſtor, Abydenus. See *Syncellus*, cap. 39. *et ſeq.* *Euſeb. Chron.* lib. i. page 5.

(p) Plin. Nat. Hiſt. lib. vii. page 413.——*Ex quo apparet æternus literarum uſus.*

(q) The celebrated Archbiſhop Uſher was the firſt who brought the Samaritan Pentateuch into Europe. In a letter to Ludovicus Capellus "he acknowledges, that the frequent mention he had ſeen made of it by ſome authors, would not ſuffer him to be at reſt till he had procured five or ſix copies of it from Paleſtine and Syria."

(r) 2 Kings, chap. xvii. ver. 24. "And the king of Aſſyria brought men from Babylon, and from Cuthah, and from Avah, and from Hamath, and from Sepharvaim, and placed them in the cities of Samaria." Babylon and Cuthah, and Avah, were neighbouring cities, and undoubtedly both ſpoke and wrote in the Chaldaic tongue. The natives of Hamath ſpoke the Syriac, which at that time differed very little from the Chaldaic.

From the reaſons above exhibited, we hope it will appear, that if the Hebrew alphabet, as it appears in the Samaritan Pentateuch, was not the primitive one, it was at leaſt that in which the Holy Scriptures were firſt committed to writing.

30
Which was introduced by Ezra.

Scaliger has inferred, from a paſſage in Euſebius *, and another in St Jerome †, that Ezra, when he reformed the Jewiſh church, tranſcribed the Scriptures from the ancient characters of the Hebrews into the ſquare letters of the Chaldeans. This, he thinks, was done for the uſe of thoſe Jews who, being born during the captivity, knew no other alphabet than that of the people among whom they were educated.—This account of the matter, though probable in itſelf, and ſupported by paſſages from both Talmuds, has been attacked by Buxtorf with great learning and no leſs acrimony. Scaliger, however, has been followed by a crowd of learned men (S), whoſe opinion is now pretty generally eſpouſed by the ſacred critics.

* *Chron. in anno* 4740.
† *Præf.* 1. *Reg.*

Having ſaid ſo much concerning the Hebrew alphabet in the preceding pages, we find ourſelves laid under a kind of neceſſity of hazarding a few ſtrictures on the vowels and Maſoretic points; the *firſt* eſſential, and the *laſt* an appendage, of that ancient language. The number of the one, and the nature, antiquity, and neceſſity of the other, in order to read the language with propriety and with diſcrimination, have been the ſubject of much and often illiberal controverſy among philological writers. To enter into a minute detail of the arguments on either ſide, would require a complete volume: we ſhall, therefore, briefly exhibit the ſtate of the controverſy, and then adduce a few obſervations, which, in our opinion, ought to determine the queſtion.

31
The Hebrew vowels.

The controverſy then is, Whether the Hebrews uſed any vowels; or whether the points, which are now called by that name, were ſubſtituted inſtead of them? or if they were, whether they be as old as Moſes, or were invented by Ezra, or by the Maſſorites (T)? This controverſy has exerciſed the wits of the moſt learned critics of the two laſt centuries, and is ſtill far enough from being determined in the preſent. The Jews maintain, that theſe vowel points (U) were delivered to Moſes along with the tables of the law; and conſequently hold them as ſacred as they do the letters themſelves. Many Chriſtian authors who have handled this ſubject, though they do not affirm their divine original, nor their extravagant antiquity, pretend, however, that they are the only proper vowels in the language, and regulate and aſcertain its true pronunciation. Though they differ from the Jews with reſpect to the origin of theſe points, they yet allow them a pretty high antiquity, aſcribing them to Ezra and the members of the great ſynagogue.

32
The Maſoretic points a modern invention.

At length, however, about the middle of the 16th century, Elias Levita, a learned German Jew who then flouriſhed at Rome, diſcovered the deluſion, and made it appear that theſe appendages had never been in uſe till after the writing of the talmuds, about 500 years after Chriſt. This innovation raiſed Elias a multitude of adverſaries, both of his own countrymen and Chriſtians. Among the latter appeared the two Buxtorfs, the father and the ſon, who produced ſome cabbaliſtical books of great antiquity (X), at leaſt in the opinion of the Jews, in which there was expreſs mention of the points. The Buxtorfs were anſwered by Capellus and other critics *, till Father Morinus †, having examined all that had been urged on both ſides, produced his learned diſſertation on that ſubject; againſt which there has been nothing replied of any conſequence, whilſt his work has been univerſally admired, and his opinion confirmed by thoſe that have beaten the ſame field after him.

* Walton, Dupin, and Voſſius.
† *Diſſert. Bibl.*

According to this learned father, it plainly appears that neither Origen, nor St Jerome, nor even the compilers of the talmuds, knew any thing of what has been called the vowel points; and yet theſe books, according to the ſame author, were not finiſhed till the ſeventh century. Even the Jewiſh rabbis who wrote during the eighth and ninth centuries, according to him, were not in the leaſt acquainted with theſe points. He adds, that the firſt veſtiges he could trace of them were in the writings of Rabbi Ben Aber chief of the weſtern, and of Rabbi Ben Naphtali chief of the eaſtern, ſchool, that is, about the middle of the tenth century; ſo that they can hardly be ſaid to be older than the beginning of that period.

Some learned men (Y) have aſcribed the invention of the vowel points in queſtion to the rabbis of the ſchool of Tiberias; which, according to them, flouriſhed about the middle of the ſecond century. This opinion is by no means probable, becauſe it appears plain from hiſtory, that before that period all the Jewiſh ſeminaries in that province were deſtroyed, and their heads forced into exile. Some of theſe retired into Babylonia, and ſettled at Sora, Naherds, and Pombeditha, where they eſtabliſhed famous univerſities. After this era there remained no more any rabbinical ſchools in Judæa, headed by profeſſors capable of undertaking this difficult operation, nor indeed of ſufficient authority to recommend it to general practice, had they been ever ſo thoroughly qualified for executing it.

Capellus and Father Morin, who contend for the late introduction of the vowel-points, acknowledge that

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(S) Caſaubon, Grotius, Voſſius, Bochart, Morin, Brerewood, Walton, Prideaux, Huet, and Lewis Capel, always a ſworn enemy to Buxtorf. All theſe have maintained the ſame ground with Scaliger: how truly, appears above.

(T) The term *maſorah* or *maſſoreth* ſignifies "tradition;" and imports the unwritten canon by which the reading and writing of the ſacred books was fixed.

(U) Theſe points are 14 in number, whoſe figures, names, and effects, may be ſeen in moſt Hebrew grammars.

(X) Theſe books are the *Bahir*, *Zahar*, and the *Kizri*. As for the Kizri, the Jews make it about 1900 years old; and the other about a century later. But the fidelity of the Jews in ſuch matters cannot be relied upon.

(Y) See Buxtorf the father, in Tiber. cap. 5, 6, 7. Buxtorf the ſon, de Antiq. Punct. P. II. 11.

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that they are certainly in no language without vowel sounds, which are indeed the soul of speech: but they assert that the Hebrew alphabet actually contains vowel characters, as well as the Greek and Latin and the alphabets of modern Europe. These are *aleph*, *he*, *vau*, *jod*. These they call the [illegible], or if you please, the parents of reading. To these four, we think, very properly, add *ain* or [illegible]. These, they conclude, perform exactly the same office in Hebrew that their descendants do in Greek. It is indeed agreed upon all hands, that the Greek alphabet is derived from the Phœnician, which is known to be the same with the Samaritan or Hebrew. This position we shall prove more fully when we come to trace the origin of alphabetic writing. Hitherto the analogy is [illegible]. The Hebrews and Samaritans employed their vowels exactly in the same manner with the Greeks; and so all was eaſy and natural. 33 The vowel letters.

34 But the admirers of the Maſoretic ſyſtem maintain, that the letters mentioned above are not vowels but conſonants or aſpirations, or any thing you pleaſe but vocal letters. This they endeavour to prove from their uſe among the Arabians, Perſians, and other oriental nations: But to us it appears abundantly ſtrange to ſuppoſe that the Greeks pronounced *beta*, *gamma*, *delta*, &c. exactly as the Hebrews and the Phœnicians did, and yet at the ſame time did not adopt their mode of pronunciation with reſpect to the five letters under conſideration. To this argument we think every objection muſt undoubtedly yield. The Greeks borrowed their letters from the Phœnicians; theſe letters were the Hebrew or Samaritan. The Greeks wrote and (z) pronounced all the other letters of their alphabet, except the five in queſtion, in the ſame manner with their originals of the eaſt. If they did ſo, it obviouſly follows that the Greek and oriental office of theſe letters was the ſame.

Another objection to reading the Hebrew without the aid of the Maſoretic vowel points, ariſes from the conſideration, that without theſe there will be a great number of radical Hebrew words, both nouns and verbs, without any vowel intervening among the conſonants, which is certainly abſurd. Notwithſtanding this ſuppoſed abſurdity, it is a well known fact, that all the copies of the Hebrew Scripture, uſed in the Jewiſh ſynagogues throughout the world, are written or printed without points. Theſe copies are deemed ſacred, and kept in a coffer with the greateſt care, in alluſion to the ark of the [illegible] in the tabernacle and temple. The prieſts, however, read the ſections of the law and hagiographa without any difficulty. The ſame is done by the remains of the Samaritans at this day. Every oriental ſcholar knows that the people of thoſe countries look upon [illegible] of words. Accordingly, in writing letters, in diſpatches upon buſineſs, and all affairs of ſmall moment, the vowels are generally omitted. It is obvious, that in every original language the ſound of the vowels is variable and of little importance. Such was the caſe with the Hebrew tongue. [illegible] try [illegible] to read [illegible] the help of the points. [illegible] the words [illegible] learn by [illegible].

When the Hebrew became a dead language, [illegible] certainly was of great [illegible] to the [illegible] the return from the Babyloniſh captivity, [illegible] might poſſibly have been adopted for the uſe of the vulgar: but the ſcribe, the lawyer, and the learned rabbi, generally diſdained ſuch trifling aſſiſtance. We ſhall in this place hazard a conjecture, which, to us at leaſt, is altogether new. We imagine that the Phœnicians, who were an inventive, ingenious people, had, prior to the age of Cadmus, who firſt brought their letters into Greece, adopted the more commodious method of inſerting the vowels in their proper places; whereas the Jews, zealouſly attached to the cuſtoms of their anceſtors, continued to write and read without them. In this manner the Gephuræi *, who were the followers of Cadmus, communicated them to [illegible] neighbours. We are convinced that the radicals of the Greek tongue are to be gleaned up in the eaſt; and upon that ground have often endeavoured to trace the origin of Greek words in the Hebrew, Phœnician, Chaldean, and Arabian languages. Reading without the vowel points we have ſeldom failed in our ſearch; but when we followed the method of reading by the Maſoretic points, we ſeldom ſucceeded; and this, we believe, every man of [illegible] erudition, who will make a trial will find by experience to be true. This argument appears to us ſuperior to every objection. Upon this baſis, the moſt learned [illegible] has erected his etymological fabric, which will be admired by the learned and ingenious as long as philology ſhall be cultivated by men. 35 Proof that the points are modern.

* Herod.

It has been urged by the zealots for the Maſoretic ſyſtem, that the Arabians and Perſians employ the vowel points. That they do ſo at preſent is readily granted; but whether [illegible] is the queſtion. That Arabia [illegible] exiles at a very early period, [illegible]. It was natural for them to retire to a land where they would not hear of war nor the ſound of the trumpet. Accordingly we find that, prior to the age of the Arabian impoſtor, Arabia ſwarmed with [illegible]. From theſe Jews, it is highly probable that their neighbours learned the uſe of the points [illegible], which in the courſe of their conqueſts [illegible] communicated to the Perſians.

It has been alleged with great ſhow of reaſon, that without the vowel points it is often impoſſible to [illegible] which occur frequently in the language: many words of different [illegible] with exactly the ſame conſonants. Without the points then, how are we to know the diſtinction? In anſwer to this objection, we beg leave to obſerve, that, during the firſt period of a language, it is impoſſible that [illegible]

(z) This is ſo true, that, according to Heſychius and [illegible] the Phœnician, ſignified to read.

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ſhould not occur a number of ſimilar ſounds of different ſignifications. This is ſurely to be attributed to the poverty of the language. When a few terms have been once fabricated, men will rather annex new ſignifications to old terms, than be at the expence of time or thought to invent new ones. This muſt have been the caſe with the Hebrew in particular; and indeed no language on earth is without inſtances of this inconveniency, which, however, in a living tongue, is eaſily overcome by a difference of accent, tone, geſture, pronunciation; all which, we think, might obviate the difficulty.

From the preceding arguments, we think ourſelves authoriſed to infer that the Maſora is a novel ſyſtem, utterly unknown to the moſt ancient Jews, and never admitted into thoſe copies of the Scriptures which were deemed moſt ſacred and moſt authentic by that people.

With reſpect to the original introduction of the points, we agree with the learned and judicious * Dr Prideaux, who imagines that they were gradually introduced after the Hebrew became a dead language, with a view to facilitate the learning to read that language, more eſpecially among the vulgar. By whom they were introduced, we think, cannot eaſily be determined; nor is it probable that they were all introduced at once, or by one and the ſame perſon. They have been aſcribed to Ezra by many, for no other reaſon that we can diſcover but to enhance their authenticity, and becauſe the ſentiment is analogous to the other articles of reformation eſtabliſhed by that holy prieſt. If our curious reader ſhould not be ſatisfied with the preceding detail, we muſt remit him to Capellus and Morinus on the one ſide, and the two Buxtorfs, Schultens, and Dr James Robertſon late profeſſor of oriental languages in the univerſity of Edinburgh, on the other. This learned orientaliſt, in his diſſertation prefixed to his *Clavis Pentateuchi*, has collected and arranged, with the true ſpirit of criticiſm, every thing that has been advanced in favour of the Maſoretical ſyſtem.—*Si Pergama dextra defendi poſſent, etiam hac defenſa fuiſſent.*

* Connect. part i. book i.

36
From Origen's Hexapla.

St Origen, who flouriſhed about the beginning of the 3d century, was a profound Hebrew ſcholar. He publiſhed a moſt laborious and learned work, which is generally called the *Hexapla*, becauſe it conſiſted of ſix columns; the firſt of which contained the Hebrew text; the ſecond, the ſame text, but written in Greek characters; the third column exhibited the verſion of Aquila; the fourth, that of Symmachus; the fifth, the Septuagint; and the ſixth, the verſion of Theodotan. In ſome fragments of that vaſt work which are ſtill extant, we have a ſpecimen of the manner in which the Hebrew was pronounced in the third century, by which it appears that it was very different from that which reſults from obſerving the Maſoretical points. The following is an inſtance copied from the beginning of Geneſis.

According to ORIGEN.

Brêſith bara Elôeim eth aſamaim oueth aares.

Ouaares aietha Thôau ouboou ouôſekh al phne Theôm ouroué elôcim maraepheth al phne amaim.

Ouiômer elôeim iei ôr ouiei ôr.

Ouiar elôeim eth aôr khi tôb ouiabdêl elôeim bên aôr oubên aoſekh.

According to the MASORITES.

Bereſhith bara Elohim eth aſhamajim veeth aaretz.

Veaaretz ajetha thoou vaboou, vekhoſhek gnal pené theom verouakh elohim merakhepheth gnal pené hammâìm.

Vaïomer elohim jehi or, vajehi or.

Vajare elohim eth aor ki tob vajabedel elohim bein aor oubein hakhoſhek.

Upon the whole, we preſume to give it as our opinion, that in the moſt early periods, the vowels, *aleph*, *he*, *jod* or *yod*, *vaw* or *waw*, and perhaps *oin* or *ajin*, were regularly written wherever they were ſounded. This to us appears plain from the practice of the ancient Greeks. It is agreed on all hands that the Samaritan and Phœnician alphabets were the ſame; and that the former was that of the Jews originally. The Phœnicians certainly wrote the vowels exactly, for ſo did the Greeks who copied their alphabet: If the Phœnicians wrote their vowels, ſo then did the Jews of the age of Cadmus; but Cadmus was contemporary with ſome of the earlieſt judges of Iſrael; the conſequence is evident, namely, that the Jews wrote their vowels as late as the arrival of that colony-chief in Greece. We ought naturally to judge of the Hebrew by the Chaldaic, Syriac, and Arabian, its ſiſter dialects. All theſe languages in ancient times had their vowels regularly inſerted; and why not the Hebrew in the ſame manner with the reſt?

37
and the practice of the ancient Greeks.

As theſe firſt vowels, which were coeval with the other letters, often varied in their ſound and application, the points, in all appearance, were firſt invented and employed to aſcertain their different ſounds in different connections. Other marks might be invented to point out the various tones of voice, like the τονοι, or accents, with which the vowels were to be enounced, as was done among the later Greeks. In proceſs of time, in order to promote celerity of writing, the vowels were omitted, and the points ſubſtituted in their place.

Before we conclude our obſervations on the Hebrew language, we ought, perhaps, to make an apology for omitting to interlard our details with quotations from the two Talmuds, the Miſhna, the Gemara, the Cabbalas, and a multitude of rabbinical writers who are commonly cited upon ſuch an occaſion. We believe we could have quoted almoſt numberleſs paſſages from the two Buxtorfs, Father Morin, Capellus, and other Hebrew critics, with no great trouble to ourſelves, and little emolument to the far greater part of our readers. But our opinion is, that ſuch a pedantic diſplay of philological erudition would probably have excited the mirth of our learned, and rouſed the indignation of our unlearned, readers. Our wiſh is to gratify readers of both deſcriptions, by contributing to the edification of one claſs without diſguſting the other.

We cannot, we imagine, fairly take leave of the ſacred language without giving a brief detail of thoſe excellencies which, in our opinion, give it a juſt claim to the ſuperiority over thoſe other tongues which have ſometimes contended with it for the prize of antiquity:

quity: and of theſe the following in our apprehenſion deſerve particular notice.

38
Excellencies of the Hebrew language.

If this language may claim any advantage over its antagoniſts, with reſpect to its being rather a mother than a daughter to any of them, it is undoubtedly in conſequence of its ſimplicity, its purity, its energy, its fecundity of expreſſions and ſignifications. In all theſe, notwithſtanding its paucity of words, it excels the vaſt variety of other languages which are its cognate dialects. To theſe we may add the ſignificancy of the names, both of men and brutes; the nature and properties of the latter of which are more clearly and more fully exhibited by their names in this than in any other tongue hitherto known. Beſides, its well authenticated antiquity and the venerable tone of its writings ſurpaſs any thing left upon record in any other dialect now extant in the world. Theſe extraordinary qualities excite our admiration at preſent under every diſadvantage; and from this circumſtance we may infer its incomparable beauty in the age of the Jewiſh legiſlator, and what effects it would naturally produce, could we know it now as it was ſpoken and written in the days of David and Solomon.

As far, however, as we underſtand it in its preſent mutilated condition, and are able to judge of its character from thoſe few books that have come down to our time, we plainly perceive that its genius is ſimple, primitive, natural, and exactly conformable to the character of thoſe uncultivated patriarchs who uſed it themſelves, and tranſmitted it to their deſcendants in its native purity and ſimplicity. Its words are comparatively few, yet conciſe and expreſſive; derived from a very ſmall number of radicals, without the artificial compoſition of modern languages. No tongue, ancient or modern, can rival it in the happy and rich fecundity of its verbs, reſulting from the variety and ſignificancy of its conjugations; which are ſo admirably arranged and diverſified, that by changing a letter or two of the primitive, they expreſs the various modes of acting, ſuffering, motion, reſt, &c. in ſuch a preciſe and ſignificant manner, that frequently in one word they convey an idea which, in any other language, would require a tedious paraphraſe. Theſe poſitions might eaſily be illuſtrated by numerous examples; but to the Hebrew ſcholar theſe would be ſuperfluous, and to the illiterate claſs neither intereſting nor entertaining.

To theſe we may add the monoſyllabic tone of the language, which, by a few prefixes and affixes without affecting the radix, varies the ſignification almoſt at pleaſure, while the method of affixing the perſon to the verb exhibits the gender of the object introduced. In the nouns of this language there is no flexion except what is neceſſary to point out the difference of gender and number. Its caſes are diſtinguiſhed by articles, which are only ſingle letters at the beginning of the word: the pronouns are only ſingle letters affixed; and the prepoſitions are of the ſame character prefixed to words. Its words follow one another in an eaſy and natural arrangement, without intricacy or tranſpoſition, without ſuſpending the attention or involving the ſenſe by intricate and artificial periods. All theſe ſtriking and peculiar excellencies combined, plainly demonſtrate the beauty, the ſtability, and antiquity of the language under conſideration.

We would not, however, be thought to inſinuate that this tongue continued altogether without changes and imperfections. We admit that many radical words of it were loſt in a courſe of ages, and that foreign ones were ſubſtituted in their place. The long ſojourning of the Iſraelites in Egypt, and their cloſe connection with that people, even *quoad ſacra*, muſt have introduced a multitude of Egyptian vocables and phraſes into the vulgar dialect at leaſt, which muſt have gradually incorporated with the written language, and in proceſs of time have become parts of its eſſence. In Egypt, the Iſraelites imbibed thoſe principles of idolatry which nothing leſs than the final extirpation of their polity could eradicate. If that people were ſo obſtinately attached to the Egyptian idolatry, it is not very probable that they would be averſe from the Egyptian language. Beſides, the Scripture informs us, that there came up out of Egypt *a mixed multitude*; a circumſtance which muſt have infected the Hebrew tongue with the dialect of Egypt. As none of the genuine Hebrew radicals exceed three letters, whatever words exceed that number in their radical ſtate may be juſtly deemed of foreign extraction.

Some Hebrew critics have thought that verbs conſtitute the radicals of the whole language; but this opinion appears to us ill founded: for though many Hebrew nouns are undoubtedly derived from verbs, we find at the ſame time numbers of the latter deduced from the former.

39
Hutchinſonian ſyſtem.

Before we conclude our detail of the Hebrew tongue, a few of our readers may poſſibly imagine that we ought to give ſome account of the Hutchinſonian ſyſtem; a ſyſtem ſo highly in vogue not many years ago. But as this allegorical ſcheme of interpretation is now in a manner exploded, we ſhall beg leave to remit our curious Hebraiſt to Mr Holloway's Originals, a ſmall book in 2 vols 8vo, but replete with multifarious erudition, eſpecially in the Hutchinſonian ſtyle and character.—*Fides ſit penes autorem.*

Sect. II. *The Arabic Language.*

40
Arabic language originally Hebrew.

We now proceed to give ſome account of the Arabic language, which is evidently one of the ſiſter dialects of the Hebrew. Both, we imagine, were originally the ſame; the former highly improved and enlarged; the latter, in appearance, retaining its original ſimplicity and rude aſpect, ſpoken by a people of a genius by no means inventive. In this inquiry, too, as in the former, we ſhall ſpare ourſelves the trouble of deſcending to the grammatical minutiæ of the tongue; a method which, we are perſuaded, would neither gratify our learned nor edify our unlearned readers. To thoſe who are inclined to acquire the firſt elements of that various, copious, and highly improved tongue, we beg to recommend *Erpenii Rudimenta Ling. Arab.; Golii Gram. Arab.;* the Diſſertations of Hariri, tranſlated by the elder Schultens; Mr Richardſon's Perſic and Arabic Gram. &c.

We have pronounced the Hebrew and Arabian ſiſter dialects: a relation which, as far as we know, has been ſeldom controverted: but we think there is authentic hiſtorical evidence that they were poſitively one and the ſame, at a period when the one as well as the [illegible] in their firſt unadorned ſimplicity. The [illegible] we think, fully authenticate the [illegible].

[illegible] the Scripture (A) were born two ſons. The name of one was Peleg, becauſe in his days [illegible] his brother's name was Yok-[illegible] Yoktan. This laſt, ſays the ſacred hiſtory, had thirteen ſons; and their dwelling reached from Meſha (Mecca) to Sephar (A)," a mount of the eaſt. According to this account, the deſcendants of [illegible] the ſouthern coaſt of Arabia from [illegible] to Mount Sephar towards the eaſt of that peninſula. Moſes, deſcribing the rivers of paradiſe, [illegible] that one of the branches of that river ‡ "encompaſſed the whole land of Havilah, where there was great ſtore of gold." Havilah was the twelfth ſon of Yoktan, whom the Arabians call Kobtan; and conſequently his territory was ſituated towards the eaſtern limit of the poſſeſſions of the poſterity of the youngeſt ſon of Eber. Yoktan or Kobtan was too young to be concerned in the building of the tower; and conſequently retained the language of his family, which was undoubtedly the Hebrew. His deſcendants muſt have carried the ſame language into their reſpective ſettlements, where it muſt have been tranſmitted to ſucceeding generations. The original language of all the tribes of the Arabians who inhabit a vaſt tract of country along the ſouthern ſhore, according to this deduction, was that of their father Kobtan, that is, the Hebrew. Indeed, the moſt learned Arabians of modern times unanimouſly acknowledge this patriarch as the founder of their language as well as of their nation.

‡ Gen. ii. 11.

The other diſtricts of Arabia were peopled by the offſpring of Abraham. The Iſhmaelites, the poſterity of that patriarch by Hagar, penetrated into the very centre of the peninſula; incorporated, and in proceſs of time became one people with the Kobtanites. Another region was poſſeſſed by the children of the ſame holy man by Cheturah his ſecond wife. The Moabites, Ammonites, Edomites, Amalekites, &c. who ſettled in the various regions of Arabia Petræa, were all branches of Abraham's family, and uſed the ſame language with their great progenitor. The Scripture indeed ſpeaks of people who inhabited the country laſt mentioned prior to the branches of Abraham's family; but theſe, according to the ſame hiſtory, were extirpated by the former. The concluſion then is, if we credit the Moſaic account, that all the inhabitants of the three diviſions of Arabia did, in the earlieſt periods, univerſally uſe the Hebrew tongue.

There was, we are ſenſible, a region of Arabia inhabited by the Cuſhim, or deſcendants of Cuſh. This diſtrict was ſituated on the confines of Babylonia. Our tranſlators have confounded this country with the modern Ethiopia; and have conſequently aſcribed the exploits of the Arabian Cuſhim to the Ethiopians. The Arabian kings of Babylon were of thoſe Cuſhim. Theſe were conquered and expelled Babylonia by the Chaſidim. Theſe ſpoke the Chaldean dialect, as will appear when we come to ſpeak of that of the Abyſſinians. Here the candid reader is deſired to reflect that the Hebrew and Chaldaic are cognate dialects.

[illegible] Language.

The foregoing proofs, deduced from the Moſaic hiſtory, will be corroborated by a maſs of internal evidence in the ſucceeding parts of our inquiry.

[illegible] Gradually [illegible] that originality.

The Arabic tongue, originally pure Hebrew, was in proceſs of time greatly transformed and [illegible] from its ſimple unſophiſticated ſtate. The Arabians were divided into many different tribes; a circumſtance which naturally produced many different dialects. Theſe, however, were not of foreign growth. No foreign enemy ever conquered thoſe independent hords. The Perſians, Greeks, and Romans, ſometimes attempted to invade their territories; but the roughneſs of the ground, the ſcarcity of forage, the penury of water, and their natural bravery, always protected them. They were indeed once invaded by the Abyſſinians or Ethiopians with ſome ſhow of ſucceſs; but theſe invaders were in a ſhort time expelled the country. Their language, of conſequence, was never adulterated with foreign words or exotic phraſes and idioms. Whatever augmentations or improvements it received were derived from the genius and induſtry of the natives, and not from adventitious or imported acquiſitions. From this circumſtance we may juſtly infer, that the Arabian tongue was a long time ſtationary, and of courſe differed in no conſiderable degree from its Hebrew archetype. The learned Schultens, in his Commentary on Job, hath ſhown, to the conviction of every candid inquirer, that it is impoſſible to underſtand that ſublime compoſition without having recourſe to the Arabic idioms. That patriarch was a Chuzite. His country might be reckoned a part of Arabia. His three friends were actually Arabians, being the deſcendants of Iſhmael and Eſau. His country bordered upon that of the predatory Chaldeans, who were an Arabian banditti. When we conſider all theſe circumſtances *in cumulo*, we are ſtrongly inclined to believe that the book of Job was actually written in Arabic, as the language ſtood at that period; which, according to the moſt probable opinion, could not have been later than the age of Moſes. The learned are generally agreed that this whole book, the three firſt chapters excepted, is a poetical compoſition, replete with the moſt brilliant and moſt magnificent imagery, the boldeſt, the juſteſt, and moſt gorgeous tropes and alluſions, and a grandeur of ſentiment wholly divine. Whoever has read the poetical compoſitions of the modern Arabians, on divine ſubjects, with any degree of taſte, will, we flatter ourſelves, diſcover a ſtriking ſimilarity both of diction and ſentiment. Be this as it may, we think there is no reaſon to conclude that the Arabic dialect deviated much from the Hebrew ſtandard prior to the Chriſtian era.

42 The two principal dialects of Arabia.

Of thoſe different dialects which prevailed among the various tribes among which the peninſula of Arabia was divided, the principal were the Hemyaret and the Koreiſh. Though ſome of theſe were tributary to the Tobbas, or Hemyaret ſovereign of Arabia Felix, yet they took no great pains to cultivate the language of that province, and of courſe theſe people did not thoroughly

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(A) Sephar, in the Septuagint Σοφηρα, and in ſome editions Σωφηρα: Hence probably Σωφιρ. *Orig. in Job.* cap. xxii. ver. 14. *Φασι δε τινες των Ερμηνεων Σωφιρ την Αφρικην ειναι.*

[illegible]

[illegible] an tribe, and indeed from every other country where the [illegible] religion [illegible]. [illegible] tribes. Numbers of the pilgrims [illegible] first rank, and [illegible] country or their age. Great fairs were held during their residence at Mecca, and a variety of gay amusements [illegible]. In these entertainments literary compositions bore the [illegible] genius considering not his own reputation alone, but even [illegible] mental, and the other as a necessary accomplishment in [illegible] a place called *Ocadh*, had been in consequence established about the end of the sixth century, where all were [illegible] the assembly at large; and the most approved of their poems, written on silk, in characters of gold, were with [illegible].

43 [illegible]

[illegible] came the purest, the richest, and the most polite, of all [illegible] tury it was the general language of Arabia, the other dialects being either incorporated with it, or sliding gradually into disuse. By this singular idiomatic union [illegible] site senses of the same or similar words, hath furnished their writers with a wonderful power of indulging, in the fullest range, their favourite passion for antithesis and quaint allusion. One instance of this we have in the word *veli*; which signifies a *prince*, a *friend*, and also a [illegible] only, becomes *vali*; which, without equivocation, im[illegible] most every page of every Arabic dictionary.

44 [illegible]

But all those advantages of this incomparable language are merely modern, and do not reach higher than the beginning of the sixth century. Prior to that era, as we have observed above, a variety of dialects obtained; and as the Arabs were by their situation in a manner sequestered from all the rest of mankind, it [illegible] change.

[illegible]

[illegible] mercantile, and little calculated to excite or promote in[illegible] usurpation of the pastor kings, every shepherd, that is, [illegible] From that quarter, therefore, they could not derive much intellectual improvement. Besides, when an extensive [illegible] or clans, the feuds and contests which originate from in[illegible] time, and less inclination, for the culture of the mind. [illegible] were the only sciences cultivated by the people in que[illegible] that it was both studied and practised at a very early pe[illegible] very late acquisitions, and sprung from some circumstance external and adventitious.

The tribe of the Koreish were much engaged in commerce. They exported frankincense, myrrh, cassia, galbanum, and other drugs and spices, to Damascus, Tripoli, Palmyra, and other commercial cities of Syria and its neighbourhood. Upon these occasions the Arabian traders must have become acquainted with the Greek language, and perhaps with the more amusing and affecting parts of the Grecian literature. They might hear of the high renown of Homer and De[illegible] might be able to read their compositions. Every body knows with what unremitting ardour the learned Arabs, under the first khaliffs, perused and translated the philosophical works of the Grecian sages. The very same spirit might animate their predecessors, though they wanted learning, and perhaps public encouragement, to arouse their exertions. From this quarter, we think, the Arabs may have learned to admire, and then to imi[illegible].

The Ptolemies of Egypt were the professed patrons of commerce as well as of learning. Under these princes all nations were invited to trade with that happy country. The Arabs, now no longer fettered by Egyptian jealousy, carried their precious commodities to Alexandria; where the Grecian literature, though no longer in its meridian splendor, shone however with a [illegible] was the retreat of all the most celebrated geniuses of [illegible] native land of learning and ingenuity. Here the ingenious Arab must have heard the praises of learning in[illegible] the public exhibitions of the poets and orators; and even though he did not understand them exactly, might [illegible] er will please to reflect, that the Arabian traders [illegible] learning, and fortune. These wise men, to use the [illegible] of their race, might hear of the celebrated Olympic [illegible] the glorious prize beſtowed upon the conquerors. Such information might animate them to inſtitute ſomething parallel at Mecca, with a view to improve their language, and at the ſame time to derive honour and emolument to themſelves. The Koreiſhim might promiſe themſelves the like advantages from the eſtabliſhment of the fair and aſſembly at Ocadh, as the natives of Elis drew from the inſtitution of the Olympic games. For theſe reaſons, we conjecture, the literary competitions at the place juſt mentioned were inſtituted at ſo late a period, though the nation had exiſted more than 2000 years before the eſtabliſhment of this anniverſary. Upon the whole, we are inclined to believe, that the Arabs, notwithſtanding all the fine things recorded of them by their own poetical hiſtorians, and believed perhaps too eaſily by thoſe of other countries, were in the days of ignorance like the earlieſt Romans, *latrones et ſemibarbari.* For our part, we think it by no means probable, that a people of that character ſhould, after ſo long a courſe of years, have ſtumbled upon ſo laudable and ſo beneficial an inſtitution, without taking the hint from ſome foreign one of a ſimilar complexion. This we acknowledge is only a conjecture, and as ſuch it is ſubmitted to the judgment of the reader.

There were, as has been obſerved above, two principal dialects of the original Arabic: The Hamyarite ſpoken by the genuine Arabs, and the Koreiſhite or pure Arabic, which at laſt became the general language of that people. The former of theſe inclined towards the Syriac or Chaldean; the latter being, according to them, the language of Iſhmael, was deeply tinctured with the Hebrew idiom. The oriental writers tell us that Terah, the grandfather of Hamyar, was the firſt whoſe language deviated from the Syriac to the Arabic. Hence, ſay they, the Hamyaritic dialect muſt have approached nearer to the purity of the Syriac, and of conſequence muſt have been more remote from the true genius of the Arabic than that of any of the other tribes. The fact ſeems to ſtand thus: The Hamyarites were neighbours to the Chaldeans and Syrians, and conſequently were connected with thoſe people by commerce, wars, alliances, &c. This circumſtance introduced into their language many phraſes and idioms from both theſe nations. That Terah was concerned in adulterating the dialect of the Hamyarites, is a mere oriental legend, fabricated by the Arabs after they began to peruſe the Hebrew Scriptures. The Koreiſh being ſituated in the centre of Arabia, were leſs expoſed to intercourſe with foreigners, and therefore preſerved their language more pure and untainted.

46
The Koran written in the Koreiſh dialect.

The learned well know, that the Koran was written in the dialect of the Koreiſh; a circumſtance which communicated additional ſplendor to that branch of the Arabian tongue. It has been proved, that the language of the original inhabitants of Arabia was genuine Hebrew; but upon this ſuppoſition a queſtion will ariſe, namely, whether the Arabians actually preſerved their original tongue pure and unſophiſticated during a ſpace of 3000 years, which elapſed between the deluge and birth of Mohammed; or, whether, during that period, according to the ordinary courſe of human affairs, it underwent many changes and deviations from the original ſtandard?

The admirers of that language ſtrenuouſly maintain the former poſition; others, who are more moderate in their attachment, are diſpoſed to admit the latter. Chardin obſerves of the oriental languages in general, that they do not vary and fluctuate with time like the European tongues*. "Ce qu'il y a de plus admirable, dit il, et de plus remarquable, dans ces langues, c'eſt, qu'elles ne changent point, et n'ont point changé du tout, ſoit à l'égard de termes, ſoit à l'égard du tour: rien n'y eſt, ni nouveau ni vieux, nulle bonne façon de parler, n'a ceſſé *d'etre* en credit. L'Alcoran, par exemple, eſt aujourdhui, comme il y a mille années, le modele de plus pure, plus còurte, et plus eloquente diction." It is not to our purpoſe to tranſcribe the remaining part of the author's reflection upon this ſubject: From the above it plainly appears that he concludes, that the Arabian tongue has ſuffered no change ſince the publication of the Koran; and at the ſame time inſinuates, that it had continued invariable in its original purity through all ages, from the days of Kobtan to the appearance of that book. Whether both or either of theſe ſentiments is properly authenticated will appear in the ſequel.

47
Means adopted by the Arabs to preſerve the purity of their language.

The learned Dr Robertſon, late profeſſor of oriental languages in the univerſity of Edinburgh, informs us, that the Arabians, in order to preſerve the purity of their language, ſtrictly prohibited their merchants, who were obliged to go abroad for the ſake of commerce, all commerce with ſtrange women. We know not where this injunction is recorded, but certainly it was a moſt terrible interdict to an amorous ſon of the deſert. If ſuch a prohibition actually exiſted, we ſuſpect it originated from ſome other ſource than the fear of corrupting their language. Be that as it may, the Doctor, as well as the great Schultens, is clearly of opinion, that the language in queſtion, though divided into a great number of ſtreams and canals, ſtill flowed pure and limpid in its courſe.

48
The ſtyle of the Koran now obſolete.

Our readers who are acquainted with the hiſtory of the orientals are already apprized of the ſteady attachment of thoſe people to ancient cuſtoms and inſtitutions. We readily allow, that in the article of Language this ſame predilection is abundantly obvious; but every oriental ſcholar muſt confeſs, that the ſtyle of the Koran is at this day in a manner obſolete, and become almoſt a dead language. This fact, we believe, will not be queſtioned. If the Arabian has deviated ſo very conſiderably from the ſtandard of the Koran in little more than 1000 years, and that too after an archetype is aſcertained; by a parity of reaſon we may infer, that much greater deviations muſt have affected the language in the ſpace of 3000 years.

It is univerſally allowed by ſuch as maintain the unſullied purity of the Arabian tongue, that it was originally the ſame with the Hebrew, or with the ancient Syriac and Chaldaic. Let any one now compare the words, idioms, and phraſeology of the Koran with the remains of thoſe three languages, and we think we may venture to affirm that the difference will be palpable. This circumſtance, one would think, indicates in the ſtrongeſt terms a remarkable alteration.

The Arabs themſelves are agreed, that, notwithſtanding the amazing fecundity of their language, vaſt numbers of its radical terms have been irrecoverably loſt. But this loſs could not be ſupplied without either fabricating new words or borrowing them from foreign languages. To the latter method we have ſeen their averſion;

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* *Voyage*, vol. iii. p. 43.

ſion; and muſt therefore conclude that they adopted the former.

The Chaldeans, Syrians, and Phœnicians, had made innovations on their language at a very early period, even before conqueſts were undertaken: We ſee no reaſon to ſuppoſe that the Arabs did not innovate as well as their neareſt neighbours: the Hamyarites did actually innovate.

There are, we think, very ſtrong reaſons to believe, that Job was an Arabian, and flouriſhed prior to Moſes, perhaps as early as Jacob. The ſtyle, the genius, the figurative tone of the compoſition; the amazing ſublimity of the ſentiments, the alluſions, the pathos, the boldneſs, the variety, and irregularity, the poetical enthuſiaſm which pervades the whole poem, ſtrongly breath the Arabian ſpirit: indeed the very diction is peculiar to that ſingle book, and differs widely from that of the Pſalms and every poetical part of the ſacred canon. If we compare this book with Mohammed's Koran, we ſhall ſcarce find any reſemblance of words or phraſeology; but a wonderful ſimilarity of figures, enthuſiaſm, and elevation of ſentiments.

49
and reſembling the Hebrew in its phraſeology.

We are then led to conclude, that the Arabic did actually loſe and gain a multitude of vocables between the era of its firſt eſtabliſhment among the deſcendants of Joktan and Iſhmael, and the birth of the impoſtor.

The art of writing was introduced among the Arabs at a very late period: Without the aſſiſtance of this art, one would think it altogether impoſſible to preſerve any language in its primæval purity and ſimplicity. Our curious readers may here expect ſome account of the Arabic characters: the following detail is the moſt probable one we have been able to collect on that ſubject.

* Pococke's *Specim. Hiſt. Arab.*

50
Art of writing among the Hamyarites,

† *Ib. ibid.*

‡ Vol. iii. p. 153.

It is generally agreed*, that the art of writing was known among the Hamyarites or Homerites at a very early period. Theſe people were ſovereigns of Arabia during a courſe of many ages. Their character was ſomewhat perplexed and confuſed. It was called *al Moſnad*, from the mutual connection of the letters. The alphabet of theſe people reſembled that of the Hebrews both in the number and order of the letters, and is called *abgad heviz* †, from the firſt ten letters of the Hebrew alphabet, artificially thrown together. "And this word (ſays the learned Chardin ‡) *a*, *b*, *g*, *d*, is formed of the four letters which were heretofore the firſt in the Arabian language, as they are ſtill in that of the Hebrews." The ſame traveller is poſitive that theſe were the ancient characters of the Arabs; that they differed from Cuphite letters, which were afterwards introduced; and that they were furniſhed with vowel points. Theſe, we imagine, were the firſt ſketches of the Chaldean character, which probably the Hamyarites retained in their priſtine unpoliſhed form, after they had been poliſhed and reduced to a more elegant ſize by the original inventors.

Monuments bearing inſcriptions in theſe characters are, they tell us, ſtill to be ſeen in ſome places of Arabia. Some were engraved on rocks: and to theſe we think it probable that the patriarch Job alludes in thoſe paſſages, where he ſeems to intimate an inclination to have his ſufferings recorded in a book, and graven in the rock for ever. All the Arabians agree, that the dialect of the Hamyarites inclined towards the Syriac or Chaldean. This we have imputed to the connection of that people with the Chaldeans, who lived in their neighbourhood. If the Hamyaritic dialect was infected with the Syriac or Chaldaic, there can be no doubt that they derived their letters from the ſame quarter.

51
Chaldaic characters.

* Pococke *Orat. de Ling. Arab.*

We conclude then, that the Hamyarites knew the art of writing from the earlieſt antiquity, and that the letters they employed were the rude Chaldaic in their unimproved ſtate *. Some of the Arabians do indeed hold, that Iſhmael was the firſt author of letters; but that his characters were rude and indiſtinct, without any interval between letters or words, and that theſe were adopted by Kedar and his other children: but this tradition hath met with little credit.

With reſpect to the highly poliſhed Koreiſhites, it is agreed on all hands, that they were unacquainted with the uſe of letters till a few years before the birth of Mohammed. Two difficulties here preſent themſelves. The firſt is, how the Koreiſhite dialect, without the art of writing, happened to excel all the other dialects of the Arabic tongue, aſſiſted by that art, apparently ſo neceſſary for preſerving a language in its original purity. The ſecond is ſtill, we think, rather greater, namely, how the Koreiſh learned that moſt uſeful art at ſo late a period as the ſixth century. It is a well known fact, that ever after the Babyloniſh captivity Arabia ſwarmed with Jewiſh villages, in which the art of writing was generally known; and almoſt at the beginning of the Chriſtian era, multitudes of Chriſtians retired to the ſame country, in order to avoid the perſecutions which they ſuffered in the Roman empire. In theſe circumſtances, we think it rather ſtrange, that the Koreiſhites, highly poliſhed and acute as they were, never thought of laying hold on the opportunity of learning an art ſo very uſeful. Theſe two problems we leave to be ſolved by our more learned readers.

52
Art of writing among the Koreiſhites.

But however they be ſolved, it is univerſally acknowledged, that the Koreiſh were ignorant of letters till a few years before the birth of their prophet. Ebn Chalican (B), one of their moſt celebrated hiſtorians, informs us, that Moramer the ſon of Morra, an Anbarian, a native of Anbaris, a city of Irak (C), firſt invented alphabetical characters, and taught his countrymen to uſe them, from whom this noble invention was derived to the Koreiſhites. Theſe letters, though neither beautiful nor convenient, were long uſed by the Arabs. They were denominated *Cuphite*, from *Cupha*, a city of Irak. In this character the original copy of the Koran was written. Theſe we think were the original clumſy characters which were retained by the vulgar, after the beautiful ſquare Chaldaic letters were invented, and probably uſed by prieſts, philoſophers, and the learned

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(B) See this whole detail in Dr Pococke's *Specim. Hiſt. Arab.* p. 250. *et ſeq.*

(C) *Irak*, "Babylonia," from *Erech*, one of the cities built by Nimrod. The Arabians have generally retained the ancient names of places. Thus with them Tyre is *Tsur*, Sidon *Seyd*, Egypt *Mesri*, &c.

learned in general. These letters are often at this day used by the Arabs for the titles of books and public inscriptions.

Abauli Ebn Mocla*, about 300 years after the death of Mohammed, found out a more elegant and more expeditious character. This invention of Abauli was afterwards brought to perfection by Ebn Bowla, who died in the year of the Hegira 413, when Kader was caliph of Bagdad. This character, with little variation, obtains at this day. As we reckon this article of some importance, we shall, for the ſake of our unlearned readers, tranſcribe an excellent account of this whole matter from the very learned [illegible].

"The Cuphic character, ſays he, which had been brought from the region of the Chaldeans to the province of Hejaz, and to Mecca its capital, in the age of Mohammed, was employed by the Koreiſhites, and in it the Koran was firſt written. But as this character was rude and clumſy, in conſequence of its ſize, and ill calculated for expedition, Abauli Ebn Mocla deviſed a more elegant and expeditious one. This perſon was viſir to Arradhi the 41ſt caliph, who began to reign in the year of the Hegira 322. Accordingly, in the 10th century, under this emperor of the Saracens, the form of the Arabian alphabet underwent a change; and the former clumſy embarraſſed character was made to give way to the poliſhed, eaſy and expeditious type. Regarding this expedition alone, the author of the invention left very few vowel characters; and as the Hebrew manner of writing admits five long ones and five ſhort in different ſhapes, he taught how to expreſs all the vowels, both long and ſhort, ſuitably to the genius of the language, by three, or rather by two, ſmall points, without any danger of a miſtake: an abbreviation truly deſerving applauſe and admiration; for by placing a very ſmall line above ـَ he expreſſed *a* and *e*; and by placing the ſame below ـِ he meant to intimate *i* only. To the other ſhort ones, *o* and *u*, he aſſigned a ſmall *waw* above. In order to repreſent the long ones, he called in the *matres lectionis*, the "quieſcent letters א, ו, י;" ſo that *phatha* with *elif* intimated *a* and *o* long, i. e. *kametz* and *cholem*; *jod* placed after *keſra* became *tzeri* and *chirek* long. *Waw* annexed to *damma* made *ſchurek*."

In this paſſage, the great orientaliſt acknowledges that the viſir above mentioned, who carried the Arabian alphabet to the pinnacle of perfection, invented and annexed the vowel points for the ſake of eaſe and expedition in writing; from which we may infer, that prior to the tenth century the Arabians had no vowel points; and conſequently either read without vowels, or contented themſelves with the *matres lectionis* above mentioned.

The deſign of the author of the invention, in fabricating theſe points, was confeſſedly eaſe and expedition in writing; a circumſtance which furniſhes a violent preſumption that the Hebrew vowel-points were deviſed and annexed at ſome late period for the very ſame purpoſes.

Some, indeed, have gone ſo far as to affirm that the Arabians were the original fabricators of the vowel-points. "The Arabians † (ſays the learned Dr Gregory Sharp) were the original authors of the vowel-points. They invented three, called *fatha*, and *damma*, and *keſra*: but theſe were not in uſe till ſeveral years after Mohammed; for it is certain that the firſt copies of the Koran were without them. The Arabs have them from the Syrians." This, however, is carrying the matter too far, ſince it is certain the Syrians were acquainted with the points in queſtion long before the period above-mentioned.

Arabic language.

Though it is not our intention to enter here into a minute detail of the peculiarities of this noble language, we cannot omit obſerving one thing, which [illegible], but is not generally taken notice of by the Arabian grammarians. The roots of verbs in this dialect are univerſally triliteral; ſo that the compoſition of the 28 Arabian letters would give near 22,000 elements of the language. This circumſtance demonſtrates the ſurpriſing extent of it: for although great numbers of its roots are irrecoverably loſt, and ſome perhaps were never in uſe; yet if we ſuppoſe 10,000 of them, without reckoning quadriliterals to exiſt, and each of them to admit only five variations, one with another, in forming derivative nouns, the whole language would then conſiſt of 50,000 words, each of which may receive a multitude of changes by the rules of grammar.

54 Surpriſing extent of the Arabic language.

Again, the Arabic ſeems to abhor the compoſition of words, and invariably expreſſes very complex ideas by circumlocution; ſo that if a compound word be found in any dialect of that language, we may at once pronounce it of foreign extraction. This is indeed a diſtinguiſhing feature in the ſtructure of this tongue, as well as of ſome of its ſiſter dialects. This circumſtance has, in our opinion, contributed not a little to the amazing fecundity of that language: for as every ingredient in the compoſition of a complex idea requires a word to expreſs it, as many words became neceſſary to complete the language as there were ſimple ideas to be intimated by diſcourſe. Were all the compounds of the Greek language to be diſſolved, as probably once they were, the vocables of that tongue would infinitely exceed their preſent number.

The Arabic authors boaſt moſt unconſcionably of the richneſs and variety of their language. No human underſtanding, ſay they, is capacious enough to comprehend all its treaſures. Inſpiration alone can qualify one for exhauſting its ſources*. Ebn Chalawaih, a moſt renowned grammarian of theirs, has ſpent a whole volume upon the various names of the lion, which amount to 500; another on the names of the ſerpent, which make up 200. Mohammed al Firauzabadius affirms that he wrote a book on the uſefulneſs and different denominations of honey, in which he enumerates 80 of them; and after all, he aſſures us that he was ſtill far from having exhauſted his ſubject. To excel in a language ſo amazingly copious, was certainly a proof of uncommon capacity, and conſidered as no mean talent even among the Koreiſhites. Hence Mohammed, when ſome people were expreſſing their admiration of the eloquence of the Koran, told them that he had been taught by the angel Gabriel the language of Iſhmael, which had fallen into deſuetude.

55 Oratory and poetry of the Arabs.

In a language ſo richly repleniſhed with the choiceſt and moſt energetic terms, both oratory and poetry were cultivated with eaſe. All the difficulty conſiſted in making a choice among words and phraſes equally elegant. We may compare one of thoſe poets or orators to a young gentleman, of a taſte highly refined, walking into a repoſitory where a profuſion of the richeſt and

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* Pocock's Specimen.

† Eſſ. on the Origin of Lan. &c.

Arabic Literature.

and moſt elegant dreſſes are piled up in wild confuſion. Our beau is here diſtreſſed with variety; but to be able to chooſe the moſt handſome and moſt becoming, he muſt have received from nature a ſuperior good taſte; which he muſt likewiſe have cultivated by aſſiduous induſtry, and by aſſociating with the moſt genteel company.

The orations of the Arabs were of two kinds, metrical and proſaic. The former they compared to pearls ſet in gold, and the latter to looſe ones. They were ambitious of excelling in both; and whoever did ſo, was highly diſtinguiſhed. His ſucceſs in either of theſe departments was thought to confer honour, not only on his family, but even on his tribe. In their poems were preſerved the genealogies of their families, the privileges of their tribes, the memory of their heroes, the exploits of their anceſtors, the propriety of their language, the magnificence of banquets, the generoſity of their wealthy chiefs and great men, &c. After all, we cannot avoid being of the unpopular opinion, that this mighty parade of eloquence and poetry did not reach backward above two centuries before the birth of Mohammed, as it certainly vaniſhed at the era of the propagation of his religious inſtitutions. The two ſucceeding centuries were the reigns of ſuperſtition and bloodſhed. The voice of the muſes is ſeldom heard amidſt the din of arms.

The ancient Arabs, at whatever time poetry began to be in requeſt among them, did not at firſt write poems of conſiderable length. They only expreſſed themſelves in metre occaſionally, in acute rather than harmonious ſtrains. The Proverbs of Solomon, and the book of Eccleſiaſtes ſeem to be compoſed in this ſpecies of verſification. The proſody of the Arabs was never digeſted into rules till ſome time after the death of Mohammed; and this is ſaid to have been done by Al Khalti al Farabidi, who lived in the reign of the caliph Karan of Raſchid.

After ſo many encomiums on the copiouſneſs of the Arabic tongue, one claſs of our readers may poſſibly expect that we ſhould ſubjoin a brief detail of its genius and character; and this we ſhall do with all poſſible brevity.

56 Genius and character of the language.

All the primary or radical words of the language are compoſed of different combinations of conſonants by *triads;* ſo that the various combinations and conjunctions of radicals make more than 10,000, even without including thoſe which may ariſe from the meeting of guttural letters. From this quality of the language has flowed that ſtability of the dialect which has preſerved it pure and entire for ſo many thouſand years, and ſecured it from thoſe changes and that fluctuation to which moſt other tongues are ſubject.

Perhaps, notwithſtanding its copiouſneſs and variety, no other language can vie with the one in queſtion in point of perſpicuity and preciſion. It is poſſeſſed of a brevity and rotundity which, amidſt the greateſt variety, enables it to expreſs with clearneſs and energy what could not be expreſſed in any other tongue without tedious circumlocutions. To this purpoſe we ſhall beg leave to tranſcribe a paſſage from Biſhop Pococke's oration on the Arabic language. As we imagine few of our readers who will have the curioſity to peruſe this article can be unacquainted with the Latin tongue, we ſhall give it as it ſtands in the original, without a tranſlation.

"Neque in nulla certe laudis parte, mira illa qua, non ſolum verborum in ſignificando, perſpicuitate, ſed in prolatione, elegantiæ et dulcedini caverunt, ſedulitas; quoque, non ſolum accurata, inter literas ex ſignificata proportione, ſenſus vel intenſioni, vel remiſſioni, prout res poſtulaverit, literarum appoſitione, ſubductione, vel juxta organorum, rationem proſpexerunt; ſed et ne quid delicatulis auribus ingratum, ne quid horridum, aut *ασυμφωνον*, reperiatur, effecerunt. Hoc in genere eſt, quod nuſpiam in verbo aliquo, genuinæ apud Arabes originis, concurrunt, non intercedente vocalis alicujus motione conſonantes, cum vel tres, vel plures, aliis in linguis frequenter collidantur. Immo neque, ſi adſint, quæ aſperitati remedio ſint, vocales, quas libet temerè tamen committunt conſonantes; ſed ita rei natura poſtulat, ut concurrere debeant illa, quæ ſe invicem, ſine aſperitatis inductione conſequi, et inter ſe connecti non poſſint; illi vel ſitus, vel literarum mutatione, eas abjiciendo, inſerendo, emolliendo, aliiſve quibus poſſent modis, remedia quærunt; adeo ab omni, quod vel abſonum, vel diſſonum eſt, abhorrent. Quod ſi nobis ſecus videntur, et aſperius ſonare ab Arabibus prolata, illud auribus noſtris, et uſui, non linguæ imputandum, nec mollius illis ſonare noſtra, quam eorum nobis cenſendum. Quin et quarundam, quæ nobis maxima aſperitatis cauſâ videntur, abſentiam, ut magnum in lingua Græca defectum, arguunt Arabes."

The learned Dr Hunt, late profeſſor of the Hebrew and Arabic languages at Oxford, is of the ſame opinion with the very learned prelate, part of whoſe oration we have tranſcribed above, with reſpect to the delicacy and elegance of the Arabian language:—"Nuſquam, mihi credite, (inquit ille) auribus magis parcitur quam in Arabia; nulla lingua à κακοφωνίᾳ alienior quam Arabica. Quamquam enim nonnullæ ejus literæ minus fortaſſe ſuaviter, immo durius etiam ſonuerint, ita tamen Arabes eas temperarunt cum lenibus, duras cum mollibus, graves cum acutis miſcendo, voces inde non minus auribus jucundæ, quam pronunciatu faciles confecerint, totique ſermoni miram ſonorum tam dulcedinem quam varietatem addiderint. Quod quidem orationis modulandæ ſtudium in Corano adeo manifeſtum eſt, ut primi Iſlamiſmi oppugnatores eum librum magica ideo arte ſcriptum dixerint. Non auribus tantum gratus eſt Arabiſmus, ſed et animi conceptibus exprimendis aptus, ſonos ſuos ſententiis ſemper accommodans, et felici verborum junctura eorum naturam depingens."

To theſe we might add quotations from Erpenius's oration on the ſame ſubject, from Golius, Schultens, Hottinger, Bochart, and Sir William Jones; beſides a whole cloud of oriental witneſſes, whoſe extravagant encomiums would rather aſtoniſh than edify the far greater part of our readers. Theſe panegyrics may perhaps be in ſome meaſure hyperbolical; but in general we believe them pretty well founded. At the ſame time we are convinced that the Arabic, however melodious in the ears of a native, ſounds harſh and unharmonious in that of an European.

When we conſider the richneſs and variety of the Arabic tongue, we are led to conclude, that to acquire a tolerable degree of ſkill in its idioms, is a more difficult taſk than is generally imagined; at leaſt

Arabic [illegible]

people who have acquired the knowledge of the Greek and Latin, and likewise of the more faſhionable modern languages, with facility enough, have found it ſo. Be that as it may, there are two claſſes of men who, in our opinion, cannot handſomely diſpenſe with the knowledge of that almoſt univerſal tongue: the gentleman, who is to be employed in the political tranſactions of the moſt reſpectable mercantile company upon earth, in the eaſtern parts of the world; and the divine, who applies himſelf to inveſtigate the true purport of the ſacred oracles: without this, the former will often find himſelf embarraſſed in both his civil and mercantile negociations; and the latter will often grope in the dark, when a moderate acquaintance with that tongue would make all ſunſhine around him.

Bochart, Hottinger, Schultens, Pocock, Hunt, and Robertſon, &c. have taken wonderful pains, and laviſhed a profuſion of learning, in proving the affinity and dialectical cognation between the Hebrew and Arabic. Much of this labour, we think, might have been ſpared. We preſume to affirm, that no perſon tolerably verſed in both languages can read a ſingle paragraph of the Arabic verſion of the New Teſtament, or indeed of the Koran itſelf, without being convinced of the truth of this poſition: it is but ſtripping the latter of its adventitious frippery, and the kindred features will immediately appear.

The learned profeſſors of the univerſity of Leyden were the firſt who entered upon the career of Arabian learning. To them the European ſtudents are principally indebted for what knowledge of that language they have hitherto been able to attain. Though ſeveral Italians have contributed their endeavours, yet the fruit of their labours has been rendered almoſt uſeleſs by more commodious and more accurate works printed in Holland.

The palm of glory, in this branch of literature, is due to Golius, whoſe works are equally profound and elegant; ſo perſpicuous in method, that they may always be conſulted without fatigue, and read without languor. Erpenius's excellent grammar, and his memorable dictionary, will enable the ſtudent to explain the hiſtory of *Taimur* by *Ibni Arabſhah*. If he has once maſtered that ſublime work, he will underſtand the learned *Arabic* better than moſt of the Khatabs of Conſtantinople or of Mecca.

The Arabian language, however, notwithſtanding all its boaſted perfections, has undoubtedly ſhared the fate of other living languages[*]; it has gradually undergone ſuch conſiderable alterations, that the Arabic ſpoke and written in the age of Mohammed may be now regarded as a dead language: it is indeed ſo widely different from the modern language of Arabia, that it is taught and ſtudied in the college of Mecca juſt as the Latin is at Rome.

The dialect of the Highlands of Yemen is ſaid to have the neareſt analogy to the language of the Koran, becauſe theſe Highlanders have little intercourſe with ſtrangers. The old Arabic is through all the Eaſt, like the Latin in Europe, a learned tongue, taught in colleges, and only to be acquired by the peruſal of the beſt authors.

SECT. III. *Of the Chaldean, Phœnician, Ethiopian or Abyſſinian, and Egyptian Languages.*

Chaldean Language, &c.

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Connection of the Chaldean, Phœnician, Ethiopic, and Egyptian languages.

As there is a very ſtrict connection and dialectical analogy among theſe languages, we have arranged them all under one ſection; eſpecially ſince what is obſerved relating to one of them may, without the leaſt ſtraining, be extended to them all. We ſhall begin with the Chaldaic.

The Chaldeans, or Chaſidim, as they are always called in Scripture, were the deſcendants of Cheſed the ſon of Nahor, the brother of Abraham. The deſcendants of this patriarch drove the Cuſhim or Arabians out of Babylonia, and poſſeſſed themſelves of that country at a very early period. As theſe Chaſidim or Chaldeans were the poſterity of Nahor, the deſcendant of Heber, they undoubtedly ſpoke the original Hebrew tongue as well as the other branches of that family. But being an ingenious inventive people, they ſeem to have poliſhed their language with much care and delicacy of taſte.

The only genuine remains of the ancient Chaldaic language are to be found in the Hebrew Scriptures; and thoſe are contained in 268 verſes, of which we have 200 in Daniel, reaching from verſe 4th chapter 2d to chapter 8th excluſive; in Ezra 67, in chapter 4th, 17 verſes; chapter 5th, the ſame number; chapter 6th, 18 verſes; and in chapter 7th, 15: in Jeremiah, chapter 10th, there is extant only one verſe. From theſe fragments, compared with the Hebrew, it plainly appears, that the difference between that language and the Chaldaic is ſcarce equal to that between the Doric and Ionic dialects of the Greek.

Whatever might have been the form of the moſt ancient Chaldaic letters, it is generally known that the beautiful ſquare characters, in which the Hebrew Scriptures began to be written after the age of Ezra, were current among them at an era prior to the Babyloniſh captivity. Thoſe elegant characters were probably the invention of the Chaldean academies, which were eſtabliſhed in various parts of that extenſive and fertile country.

59
Chaldean differs little from the Hebrew.

The Chaldean declenſions and conjugations differ ſo little from the Hebrew modifications, that it would be almoſt ſuperfluous to dwell upon them in this ſection. The moſt effectual way to acquire an idea of the ancient Chaldaic, is to decompound the names confeſſedly of that dialect, which occur in many places of Scripture. By this method of proceeding, its beautiful ſtructure and expreſſive energy will be readily comprehended even by the moſt illiterate claſſes of our readers. At the ſame time, we muſt obſerve, that the Chaldaic and ancient Syriac bore ſo near a reſemblance to each other, that they have generally been claſſed under one head.

The firſt Chaldaic word that occurs in the Old Teſtament is *bara* "*creavit*." This word has all along been aſſigned to the language under conſideration; for what reaſon, we confeſs we are not able to diſcover. The greateſt part of the Hebrew tongue is now loſt. The words *bar*, "a ſon," and *bara* "*creavit*," rather *filiavit*), may probably be of that number. Another Scripture word which is often quoted, and always aſcribed either to the Syriac or Chaldaic, is *igar* or *jegar ſahadutha*,

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[*] "*Ut folia in ſylvis pronos mutantur in annos, &c.*"

Chaldean Language, &c.

ſahadutha, which ſignifies "a monument of witneſſes." Every body knows, that when Jacob and Laban made their compact, the latter denominated the heap of ſtones reared upon that occaſion in this manner; while the former called it *Galeed*, as we now write and pronounce it. This pronunciation, however, does not appear to us altogether genuine. The word is probably compounded of גל *gal*, *cumulus*, "a heap," and עד *chad*, *æternitas*, *ſeculum*, "eternity, an age:" ſo that גלעד *galchad*, or *galaad* as it came to be written afterwards, ſignified an "everlaſting heap." Laban then had reſpect to the end for which the monument was erected; but Jacob alluded to its duration. It appears, however, upon this and every other occaſion, when Chaldaic words are mentioned, that א, *a*, was a favourite letter both with the Syrians and Chaldeans. We may likewiſe obſerve, that the ſame people always changed the Hebrew ש *ſhin* into ת *thau*, in order to avoid the ſerpentine ſound of that conſonant.

60 Its proper names pure Hebrew.

The Chaldaic names of gods, men, places, &c. which occur in Scripture, appear to be no other than Hebrew poliſhed and improved. *Bel*, *Belus* in Latin, is evidently בעל *Baal*, or we think rather ב-על *Bechel*. The Phœnicians, and ſometimes the Hebrews, uſed it to ſignify *the moſt high*. The Chaldeans uſed their word *Bel* for the ſame purpoſe; and becauſe this word originally imported the *High One*, they dignified their firſt monarch with that name. They denominated their capital city *Ba-Bel*, which imports the *temple of Bel*, and afterwards *Babylon*, which intimates *the abode or dwelling of our lord the ſun*. *Nebo* was a name of the moon among the Babylonians, derived from the Hebrew נבא, *nabah*, *vaticinari*, "to prophecy." *Azer* was the planet Mars, from אער, *Azer* or *Ezur*, *accinxit*, "to gird," alluding to the girding on of arms. *Ahad* was an Aſſyrian name of the ſun *, a word deduced from the Hebrew אער *ahad*, *unus*, "one." *Netzar* was the name of an Arabian idol †, which often occurs in the compoſition of Babylonian names. In Arabic it ſignifies an *eagle*: we think, however, that the word is the Hebrew נער *natzar*, *cuſtodivit*, *ſervavit*, "to keep, to preſerve." To theſe names of deities many more might be added, which the nature of our deſign will not allow us to mention.

Almoſt all the Chaldean proper names which occur either in ſacred or profane hiſtory are evidently of Hebrew original, or cognate with that language. We ſhall ſubjoin a few examples: *Nabonaſſar* is evidently compounded of *Nabo* and *nazur*, both Hebrew words. *Nabopollazar* is made up of *Nabo-Pul*, the ſame with *Bel*, and *Azer* or *Azor*, above explained. *Beleſis* is made up of *Bel* and אשא *Eſha*, "fire." Nebuchadnezzar, Belſhazzar, Beltiſhazzar, Neriglíſſar, Nebuzaradan, Rabmag, Rabſaris, Nergal Sharezer, Rabſhakeh, Ezarhaddon, Merodach, Evil Merodach, and numberleſs others, are ſo manifeſtly reducible to Hebrew vocables, when decompounded, that the oriental ſcholar will readily diſtinguiſh them.

Names of places in the Chaldaic are likewiſe ſo nearly Hebrew, that nothing but the dialectical tone ſeparates them. Thus *Ur* of the Chaldees is actually אור *light*, that city being ſacred to the ſun; *Sepharvaim* is plainly the Hebrew word *Zipporah*; *Carchemiſh*, a city on the Euphrates, is evidently compounded of *Kir* or *Kar* "a city," and *Chemoſh*, a name of the ſun. In ſhort, every Chaldean or old Syrian word now extant, without any difficulty, betray their Hebrew original. As for their dialectical differences, theſe we remit to the Chaldaic grammars and lexicons.

61 Phœnician language.

We now proceed to the conſideration of the Phœnician language, which is known to have been that of the ancient Canaanites. That this was one of the original dialects, and conſequently a cognate of the Hebrew, is almoſt univerſally acknowledged. Inſtead therefore of endeavouring to prove this poſition, we may refer our readers to the works of the learned Mr Bochart, where that author has in a manner demonſtrated this point, by deriving almoſt all the names of the Phœnician colonies from the Hebrew, upon the ſuppoſition that the dialect of thoſe people was cloſely connected with that tongue. St Auguſtine, *de Civitate Dei*, has obſerved, that even in his time many of the vulgar in the neighbourhood of Carthage and Hippo ſpoke a dialect of the old Punic which nearly reſembled the Hebrew. Procopius, *de bello Goth.* informs us, that there exiſted even in his days in Africa a pillar with this inſcription in Hebrew, "We flee from the face of Joſhua the robber, the ſon of Nun." The names of all the ancient cities built by the Carthaginians on the coaſt of Africa are eaſily reducible to a Hebrew original. The Carthaginian names of perſons mentioned in the Greek and Latin hiſtory, ſuch as Himilco, Hamilcar, Aſdrubal, Hannibal, Hanno, Dido, Anna or Hannah, Sophoniſba, Giſgo, Maharbal, Adherbal, &c. all breathe a Hebrew extraction.

The Greeks borrowed a great part of their religious worſhip from the people of whoſe language we are treating; of conſequence, the names of moſt of their gods are Phœnician. Almoſt every one of theſe is actually Hebrew, as might eaſily be ſhown. The names of perſons and places mentioned in the fragments of Sanchoniathon, preſerved by Euſebius, are all of Hebrew complexion. The names mentioned in the Hebrew ſcriptures of places which belonged to the Canaanites prior to the invaſion of the Iſraelites under Joſhua, are as much Hebrew as thoſe which were afterwards ſubſtituted in their ſtead. The Punic ſcene in Plautus has been analyſed by Bochart and ſeveral other learned men, by whom the language has been clearly proved to be deduced from the Hebrew, with ſome dialectical variations.

The iſland of Malta (Melita now) was inhabited by a colony of Phœnicians many ages before the Moors took poſſeſſion of it. Among the vulgar of that iſland many Punic vocables are current to this day, all which may be readily traced up to the Hebrew fountain. To theſe we may add many inſcriptions on ſtones, coins, medals, &c. which are certainly Phœnician, and as certainly of Hebrew extraction. We have thrown together theſe few hints without purſuing them to any great length, as we deemed it unneceſſary to dwell long on a point ſo hackneyed and ſo generally acknowledged.

62 Origin of the Ethiopians.

Before we proceed to treat of the ancient language of the Ethiopians, we find ourſelves obliged to hazard a few ſtrictures on the origin of that ancient nation. If we can once ſettle that ſingle point, the diſcovery will open an avenue to their primitive dialect, the article about which we are chiefly concerned in the preſent ſection.

In our ſection concerning the Hebrew language, we were led once to mention the patriarch Cuſh the eldeſt ſon of Ham. The poſterity of this family-chief, whom his

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* Merob. lib. i. c. 23.

† Pococke Specim. Hiſt. Arab.

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his ſon Nimrod, poſſeſſed themſelves of Shinar, afterwards denominated *Chaldæa*. Theſe were probably the Arabians whoſe kings (according to Euſebius, Africanus, and other ancient chronologers) reigned in Babylon during ſeveral ſucceſſive generations. Thoſe were the Cuſhim or Cuſhites, whom the learned Mr Bryant has conducted over a great part of the world, and to whoſe induſtry and ingenuity he has aſcribed almoſt all the inventions, arts, ſciences, laws, policy, religions, &c. which diſtinguiſh mankind in the earlieſt ages.

In proceſs of time, the poſterity of Chaſid or Cheſed, called *Chaſdim* or *Chaſidim*, in the eaſt, and *Chaldeans* in the weſt, drove out the Cuſhim, and ſeized upon their country. The Cuſhim retired weſtward, and ſpread themſelves over that part of Arabia ſituated towards the ſouth-eaſt. They probably extended themſelves over all the eaſtern part of that peninſula from the ſea to the wilderneſs between Arabia and Syria. Thoſe were the Ethiopians mentioned in Scripture by a very unpardonable inadvertency of our tranſlators. Theſe, then, we think, were the primitive Cuſhim.

Joſephus informs us*, that all the Aſiatics called the Ethiopians of Africa by the name of *Cuſhim*. This denomination was not given them without good reaſon: it imports at leaſt, that they deemed them the deſcendants of Cuſh; it being the conſtant practice of the orientals in the early ages to denominate nations and tribes from the name of their great patriarch or founder. The name *Cuſhim* muſt then have been given to the Ethiopians, from a perſuaſion that they were the progeny of the ſon of Ham who bore that name. By what route ſoever the Cuſhim penetrated into that region of Africa which was called by their name, it may be taken for granted that they were the deſcendants of Cuſh above mentioned.

It has been obſerved above, that the poſterity of Cuſh poſſeſſed the country of Shinar or Chaldea at a very early period, but were expelled by the Chaſidim or Chaldeans. Upon this cataſtrophe, or perhaps ſomewhat later, a colony from the fugitive Cuſhim tranſported themſelves from the ſouth and ſouth-eaſt coaſt of Arabia over the ſea, which lies between that country and Ethiopia. However imperfect the art of navigation might be in that age, the diſtance was ſo ſmall that they might eaſily enough make a voyage croſs that narrow ſea in open boats, or perhaps in canoes. However that may have been, it cannot be doubted that the tribes on both ſides of that branch of the ſea were kindred nations.

63
Their language originally Chaldean.

If, then, both the northern and ſouthern Cuſhim ſprung from the ſame ſtock, there can be no doubt that both ſpoke the ſame language. The language of the Babylonian Cuſhim was Chaldaic, and of conſequence that of the Ethiopian Cuſhim was the ſame. We may therefore reſt aſſured, that whatever changes the Ethiopian dialect may have undergone in the courſe of 3000 years, it was originally either Chaldaic, or at leaſt a branch of that language. Scaliger informs us, that the Ethiopians call themſelves Chaldeans; and that, ſays he, not without reaſon, becauſe of thoſe many ſacred and profane books which are extant among them, the moſt elegant and moſt beautiful are written in a ſtyle near that of the Chaldean or Aſſyrian. Marianus Victorius, who was the firſt that reduced the Ethiopic tongue to the rules of grammar, tells us, in his *Proœmium*, "that the Ethiopians call their tongue Chaldaic; that it ſprings from the Babylonian; and is very like the Hebrew, Syriac, and Arabic: At the ſame time (he concludes), that this language may be eaſily learned by thoſe who are maſters of the Hebrew." The learned Bochart, and Biſhop Walton in his *Proleg.* are clearly of the ſame opinion.

The vulgar letters of the Ethiopians, according to Diodorus Siculus, were the ſame with the ſacred† characters of the Egyptians (D). From this account, if the Sicilian may be truſted, the ſacred letters of theſe people, concerning which ſo many wiſe conjectures have been formed, were actually Chaldaic. To carry on this inveſtigation a little farther, we may obſerve, that Sir William Jones ſeems to have proved, by very plauſible arguments, that the Sanſcrit characters were deduced from the Chaldaic. This circumſtance affords a preſumption that the Ethiopian Cuſhim were likewiſe concerned with the Egyptians; who, as is remarked in the Section concerning the *Sanſcrit*, probably introduced the religion of the Brahmans into Hindoſtan. This is advanced as a conjecture only; and yet when we conſider the affinity between the Egyptian and Gentoo religions, we are ſtrongly inclined to hope that this ſurmiſe may one day be verified by undeniable facts.

64
Ancient intercourſe between the Ethiopians and Egyptians.

The original Ethiopians were a people highly civilized; their laws, their inſtitutions, and eſpecially their religion, were celebrated far and wide. Homer talks in raptures of the piety of the Ethiopians, and ſends his gods every now and then to revel 12 days with that devout people. The Sicilian adduces a number of very ſpecious arguments to prove that theſe two nations had ſprung from the ſame ſtock. He mentions a ſimilarity of features, of manners, of cuſtoms, of laws, of letters, of the fabrication of ſtatues, of religion, as evidences of the relation between thoſe two neighbouring nations. There was, every body knows, a communion, as to ſacred rites, between the two countries. The Egyptians ſent annually a deputation of their prieſts, furniſhed with the portable ſtatues of their gods, to viſit the fanes of the devout Ethiopians. Upon this occaſion, a ſolemn religious banquet was prepared, which laſted 12 days, and of which the prieſts of both nations were partakers. It was, we imagine, a kind of ſacramental inſtitution, by which both parties publicly avouched their agreement in the ceremonies of their religion reſpectively. Theſe obſervations plainly ſhow, that the moſt ancient Ethiopians were a people highly civilized; indeed ſo much, that the Egyptians were at one time contented to be their ſcholars. The tone of their language was certainly the ſame with that of the Chaldeans or Arabian Cuſhim, from whom they are deſcended. We know not whether there are any books in the ancient Ethiopic now extant; ſo that it is not eaſy to produce inſtances of its coincidence with the Chaldaic. Diogenes Laertius * informs us, that Thraſyllus, in his catalogue

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* Antiq. Jud. lib. i. c. 7.

† Lib. iii. p. 101. Steph.

* Lib. ix. p. 461. Caſaub.

(D) We find the ſame obſervation confirmed by Heliodorus (*Ethiop.* lib. x. p. 476.). "The royal letters of the Ethiopians (ſays he) were the ſacred characters of the Egyptians." Caſſiodorus likewiſe aſſures us, "That the letters inſcribed upon the Egyptian obeliſks were Chaldean." See Sect. *Sanſcrit.*

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talogue of the books compoſed by Democritus, mentions one, περι των εν Μεροι ιερων γραμματων, *concerning the ſacred letters in the iſland of Meroe* (E); and another concerning the ſacred letters in Babylon. Had theſe books ſurvived the ravages of time, they would in this age of reſearch and curioſity have determined not only the point under our conſideration, but the affinity of ſacred rites among the Chaldeans, Ethiopians, and Egyptians.

We have now ſhown that the Ethiopians were a colony of Cuſhites; that the Cuſhites were originally ſovereigns of Shinar or Chaldea, and conſequently ſpoke either Chaldaic or a dialect of that tongue; that their coloniſts muſt have uſed the ſame language; that the ancient Ethiopians were a people highly poliſhed, and celebrated in the moſt early ages on account of their virtue and piety. It has likewiſe appeared, that the common letters of that people were the ſacred characters of Egyptians. Theſe letters, we imagine, were the Cuphite; for which ſee the Section on the *Arabic*. When they were diſcarded, and the modern ſubſtituted in their room, cannot be determined; nor is it, we apprehend, a matter of much importance. We ſhall therefore drop that part of the ſubject, and refer our curious and inquiſitive readers to the very learned Job Ludolf's (F) excellent grammar and dictionary of the Abyſſinian or Geez tongue, where they will find every thing worth knowing on that ſubject. We ſhall endeavour to gratify our readers with a very brief account of the modern Ethiopic or Abyſſinian tongue; for which both they and we will be obliged to James Bruce, Eſq. that learned, indefatigable, and adventurous traveller; who, by his obſervations on that country, which he made in perſon, often at the hazard of his life, has diſcovered, as it were, a new world both to Europe and Aſia.

65 Modern Ethiopic tongue.

The moſt ancient language of Ethiopia, which we ſhall now call *Abyſſinia* (its modern name), according to that gentleman, was the *Geez*, which was ſpoken by the ancient Cuſhite ſhepherds. This, we ſhould think, approaches neareſt to the old Chaldaic. Upon a revolution in that country, the court reſided many years in the province of Amhara, where the people ſpoke a different language, or at leaſt a very different dialect of the ſame language. During this interval, the *Geez*, or language of the ſhepherds, was dropt, and retained only in writing, and as a dead language: the ſacred Scriptures being in that tongue only ſaved it from going into diſuſe. This tongue is exceedingly harſh and unharmonious. It is full of theſe two letters D and T, in which an accent is put that nearly reſembles ſtammering. Conſidering the ſmall extent of ſea that divides this country from Arabia, we need not wonder that it has great affinity with the Arabic. It is not difficult to be acquired by thoſe who underſtand any other of the oriental languages; and as the roots of many Hebrew words are only to be found here, it ſeems to be abſolutely neceſſary to all thoſe who wiſh to obtain a critical ſkill in that language.

66 Ethiopic alphabet.

The Ethiopic alphabet conſiſts of 26 letters, each of which, by a *virgula* or point annexed, varies its ſound in ſuch a manner as that thoſe 26 [illegible] diſtinct letters. At firſt they had but [illegible] ral letters, the Latin P being wanting; [illegible] were obliged to ſubſtitute another letter in its place. *Paulus*, for example, they call *Taulos*, [illegible] *Petrus*, they pronounced *Ketros*. At laſt they ſubſtituted T, and added this to the end of their alphabet; giving it the force of P, though it was really a repetition of a character rather than the invention of a new one. Beſides theſe, there are 20 others of the nature of diphthongs; but ſome of them are probably not of the ſame antiquity with the letters of the alphabet, but have been invented in later times by the ſcribes for convenience.

The Amharic, during the long baniſhment of the royal family in Shoa, became the language of the court, and ſeven new characters were of neceſſity added to anſwer the pronunciation of this new language; but no book was ever yet written in any other language than *Geez*. There is an old law in the country, handed down by tradition, that whoever ſhall attempt to tranſlate the Holy Scripture into Amharic or any other language, his throat ſhall be cut after the manner in which they kill ſheep, his family ſold to ſlavery, and their houſes razed to the ground.

Before we leave this ſubject, we may obſerve, that all the ancients, both poets and hiſtorians, talk of a double race of Ethiopians; one in India, and another in Africa. What may have given riſe to this opinion it is not eaſy to diſcover. Perhaps the ſwarthy complexion of both people may have led them to this ſentiment. Euſebius indeed informs us*, that "a numerous colony of people emigrated from the banks of the Indus, and croſſing the ocean, fixed their reſidence in the country now called Ethiopia." For our part, we are rather inclined to believe that the original Ethiopians tranſported themſelves into India, and there perhaps cooperated with the Egyptians in digging the excavations and framing the ſtatues, ſome of which are ſtill to be ſeen in that country, and which we have mentioned in another Section. The Greeks called thoſe people Αιθιοπες, *Æthiopes* we believe, from their ſun-burnt countenance; but indeed they were very little acquainted either with the country or its inhabitants.

* *Chron.* p. 12.

67 Ancient language of Egypt a ſiſter dialect of Hebrew.

The moſt ancient name of Egypt was *Mizraim*, of conſequence the Arabians ſtill call it *Meſri*. It was likewiſe diſtinguiſhed by other names, ſuch as *Oceana*, *Aeria*, &c. It appears from the ſacred hiſtorian, that it was inhabited by the deſcendants of Mizraim the ſecond ſon of Ham. Mizraim had ſeveral ſons, who, according to the Scripture account, ſettled reſpectively in that country. If we truſt to the ſacred records, there will be little difficulty in aſcertaining the language of the Mizraim. It will appear to be one of the ſiſter dialects of the Hebrew, Phœnician, Arabic, Chaldaic, &c.; and this, to us, appears to be the fact. But the origin of that people, their language, religion, laws, and inſtitutions, have been ſo warped and confounded, both by their own hiſtorians and thoſe of other countries, that one is ſcarce able to determine what to believe or what to

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(E) Where the capital of Ethiopia was ſituated.

(F) A very learned German, who publiſhed a grammar and dictionary of the Geez in folio.

to reject. Herodotus, Diodorus Siculus, Strabo, Ptolemy, and moſt other ancient geographers and hiſtorians, are univerſally agreed, that Egypt, at leaſt that part of it called *Delta*, was overflown by the ſea, and conſequently uninhabitable for many centuries after the diſperſion of mankind. When we conſider the low ſituation of the Delta, and the violent current of the tide from the coaſt of Phœnicia and Paleſtine towards that ſhore, we would be almoſt tempted to adopt this hypotheſis; but the ſacred records avouch the contrary. According to them, we find Egypt a populous, rich, and flouriſhing kingdom, as early as the age of Abraham. Had the Lower Egypt been a pool of ſtagnating water at any time after the general deluge, we think it could not have been drained, cleared, cultivated, and ſtocked with inhabitants, ſo early as the days of Abraham.

Diodorus Siculus, however, is poſitive that the Egyptians * were a colony of Ethiopians; and this he endeavours to prove by the ſimilarity of features, cuſtoms, laws, religious ceremonies, &c. between the two nations. That there was a conſtant intercourſe of good offices between theſe two branches of the Hamites, cannot be queſtioned; and that they nearly reſembled each other in many reſpects, is too evident to admit of contradiction. The excavations, originally dug out of the ſolid rocks of porphyry and marble, in which the natives reſided before the plains were drained, have been obſerved by a moſt judicious traveller (G) a very few years ago. At the ſame time, the moſt accurate and judicious travellers (H) who have viſited that region in modern times, are generally of opinion that the land has gained nothing on the ſea ſince the period when Herodotus wrote his deſcription of that country; from which circumſtances we may be led to conclude, that the idea of the inundation of the Delta is not founded in fact.

But even admitting that the Egyptian Delta has acquired nothing from the ſea ſince the age of Herodotus to the preſent, it certainly does not follow that the region in queſtion was never overflown by that element; ſince there are, in many parts of the globe, large tracts of land, certainly once covered with ſea, which have continued to this day in the very ſame ſituation in which they were 2000 years ago. We leave the deciſion of this point to the judgement of our readers.

We have already hinted our opinion of the nature of the Egyptian language; but becauſe Egypt is generally thought to have been the native land of hieroglyphics, and becauſe many are of opinion that hieroglyphical characters were prior to alphabetical, we ſhall hazard a few conjectures with reſpect to that ſpecies of writing.

68
Egyptian hieroglyphics.

The end of ſpeech, in general, is to enable men to communicate their thoughts and conceptions one to another when preſent; the uſe of writing is to perform the ſame office when people are at ſo great a diſtance that vocal ſounds cannot mutually reach them. Hieroglyphics are ſaid to have been invented to ſupply this defect. The moſt ancient languages were everywhere full of tropes and figures borrowed from ſenſible objects. As in that ſtage of ſociety men have not learned to abſtract and generalize, all their ideas are borrowed from ſuch objects as moſt forcibly ſtrike their ſenſes. This circumſtance would naturally ſuggeſt to ſavages the idea of conveying their ſentiments to each other, when abſent, by delineations of corporeal objects. Thus, if a ſavage aſked a loan of his friend's horſe, he might find means to have conveyed to him the figure of that animal; and ſo of others. This was the very loweſt ſpecies of ideal communication, and has been ſtyled *picture-writing*.

Neceſſity would ſoon impel our ſavage correſpondents to fabricate a method more extenſively uſeful, which would likewiſe be ſuggeſted by the conſtant uſe of the metaphorical mode of ſpeech. Some ſavage leader, more ſagacious than the vulgar herd, would obſerve that certain ſenſible objects were fitted, according to the rules of analogy, to repreſent certain human paſſions, and even ſome abſtract ideas; and this would be readily enough adopted by the herd as a new improvement. In this caſe a *horn* might be the emblem of *power*, a *ſword* of *bravery*, a *lion* of *fury*, a *fox* of *cunning*, a *ſerpent* of *malice*, &c. By and by artificial ſigns might be contrived to expreſs ſuch ideas as could not readily be denoted by bodily objects. This might be called *ſymbolical writing*. Such was the foundation of the Chineſe characters; and hence that prodigious number of letters of which the written language of that people is compoſed. Farther they could not proceed, notwithſtanding their boaſted inventive powers; and farther, we believe, no nation ever did proceed, who had once upon a time no other characters but hieroglyphical. The Mexicans had arrived at the very loweſt ſtage of hieroglyphical writing, but had not taken one ſtep towards alphabetical. The Hurons employ hieroglyphical ſymbols, but never entertained a ſingle idea of alphabetical. Hieroglyphical characters are the images of objects conveyed to the mind by the organs of viſion; alphabetic are arbitrary artificial marks of ſound, accommodated by compact to convey to the mind the ideas of objects by the organs of hearing. In a word, we think that there is not the leaſt analogy between theſe two ſpecies to conduct from the one to the other: we are therefore of opinion, that hieroglyphical characters were never the vulgar channels of ideal conveyance among civilized people.

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Were never in vulgar uſe;

We know that in this point we differ from many learned, judicious, and ingenious writers; ſome of whom have taken much pains to inveſtigate the intermediate ſtages through which the fabricators of characters muſt have paſſed in their progreſs from hieroglyphical to alphabetical writing. Theſe writers have adopted a plan analogous to Biſhop Wilkins's project of an artificial language. In this theory, we own, we are led to ſuſpect that they ſuppoſed all mankind were once upon a time *ſavages*, and were left to hammer out words, as well as characters, by neceſſity, ingenuity, experience, practice, &c. For our part, we have endeavoured to prove, in our ſection on the Hebrew language, that alphabetical writing was an antediluvian invention; and we now lay it down as our opinion, that among all thoſe nations which ſettled near the centre of civilization,

* Lib. xiii. *paſſim.*

(G) See Mr Bruce's Travels, vol. i.

(H) Mr Bruce, Dr Shaw, Biſhop Pococke, Savary, Volney, &c.

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tion, hieroglyphics were, comparatively, a modern fabrication.

The Orientals are, at this day, extravagantly devoted to allegory and fiction. Plain unadorned truth with them has no charms. Hence that extravagant medley of fables and romance with which all antiquity is replete, and by which all ancient hiſtory is diſguiſed and corrupted. Every doctrine of religion, every precept of morality, was tendered to mankind in parables and proverbs. Hence, ſays the Scripture, to underſtand a proverb, the words of the wiſe, and their dark ſayings. The eaſtern ſages involved their maxims in this enigmatical dreſs for ſeveral reaſons: to fix the attention of their diſciples; to aſſiſt their memory; to gratify their allegorical taſte; to ſharpen their wit and exerciſe their judgement; and ſometimes perhaps to diſplay their own acuteneſs, ingenuity, and invention.

It was among the ancients an univerſal opinion, that the moſt ſacred arcana of religion, morality, and the ſublime ſciences, were not to be communicated to *the uninitiated rabble*. For this reaſon every thing ſacred was involved in allegorical darkneſs.

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but employed to conceal ſacred doctrines from the uninitiated;

Here, then, we ought to look for the origin of hieroglyphical or picture-writing among the civilized nations of the eaſt. They did not employ that ſpecies of writing becauſe they were ignorant of alphabetical characters, but becauſe they thought fit to conceal the moſt important heads of their doctrines under hieroglyphical figures. The Egyptian prieſts were moſt celebrated for their ſkill in deviſing thoſe emblematical repreſentations; but other nations likewiſe employed them. We learn from the fragments of Beroſus the Chaldean hiſtorian, preſerved by Syncellus and Alexander Polyhiſtor, that the walls of the temple of Belus at Babylon were covered all over with thoſe emblematical paintings. Theſe characters were called ἱεροι, becauſe they were chiefly employed to repreſent ſacred objects; and γλυφικα, becauſe they were originally carved or engraved. Their name points to their original uſe. Inſtead of purſuing theſe obſervations, which the nature of our deſign will not permit, we muſt refer our readers to Herodotus, lib. ii. Diodorus Sic. lib. i. Strabo, lib. xvii. Plut. Iſis et Oſiris; and among the Chriſtian fathers, to Clem. Alex. Euſeb. Præp. Evang.; but chiefly to Horapollo's Hieroglyphica.

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and poſterior in time to alphabetical characters.

From this deduction we would conclude, that this ſpecies of writing was an adventitious mode in Egypt, peculiar to the prieſts, and employed chiefly to exhibit things ſacred; and that among all civilized people it did not ſuperſede the uſe of alphabetical characters, nor did the uſe of the latter originate from the former. When alphabetical letters were invented, if indeed they were a human invention, they were antecedent to the other in uſe and extent. The Egyptian prieſts alone knew the true import of thoſe ſacred ſymbols; and communicated that knowledge firſt to their own children from generation to generation, then to the initiated, and laſt of all to the grandees of the nation, all of whom were indeed initiated. The hieroglyphics of Egypt were not then the ſymbols of any ſacred occult language; but ſigns invented by the prieſts and prophets or wiſe men, in order to repreſent their doctrines, the attributes and perfections of their deities, and the myſterious arcana of their religion, and many other circumſtances relating to objects of importance, which were deemed either too ſacred or too important to be imparted to the vulgar.

The Egyptians aſcribed the invention of letters to a perſon whom they called *Thoth**, *Thoyth*, or *Thouth*; the Greeks Ἑρμης; and the Romans *Mercurius*. Plato† calls him a god, or a godlike man; Diodorus‡ makes him privy counſellor to Oſiris; Sanchoniathon ap. Euſeb. § connects him with the Phenician Cronus or Saturn. To this Mercury the Egyptians aſcribe the invention of all the arts and ſciences. He was probably ſome very eminent inventive genius, who flouriſhed during the firſt ages of the Egyptian monarchy, and who perhaps taught the rude ſavages the art of writing.

* Euſeb. Præp. Ev.
† Phædrus.
‡ Lib. i.
§ *Præp. Ev.*

72
Two kinds of alphabetical characters in Egypt.

According to Diodorus Siculus, the Egyptians had two kinds of letters*; the one ſacred, the other common: the former the prieſts taught their own children, the latter all learned promiſcuouſly. In the ſacred characters the rites and ceremonies of their religion were couched; the other was accommodated to the ordinary buſineſs of life. Clem. Alexand. mentions three different ſtyles of writing employed by the Egyptians†. "The pupils, who were inſtructed by the Egyptians, firſt learned the order and arrangement of the Egyptian letters, which is called *epiſtolography*, that is, the manner of writing letters; next, the ſacred character, which the ſacred ſcribes employed; laſtly, the hieroglyphic character, one part of which is expreſſed by the firſt elements, and is called *Cyriologic*, that is, *capital*, and the other *ſymbolic*. Of the ſymbolic kind, one part explains properly by imitation; and the other is written tropically, that is, in tropes and figures; and a third by certain enigmatical expreſſions. Accordingly, when we intend to write the word *ſun*, we deſcribe a circle; and when the moon, the figure of that planet appearing horned, conformable to the appearance of that luminary after the change." In this paſſage we have an excellent deſcription of the three different modes of writing uſed by the Egyptians; the common, the ſacred, and the hieroglyphic. The laſt he deſcribes according to its three diviſions, in exact conformity to our preceding obſervations.

* Lib. i.
† *Strom.* lib. v.

73
The ſacred letters and language [illegible]

By the deſcription above tranſlated, it plainly appears, that the ſacred character of the Egyptians was entirely different from the hieroglyphic; and by this conſideration we are in a good meaſure juſtified in ſuppoſing, as we have done all along, that the ſacred letters of the Egyptians were actually the Chaldaic. The inſcriptions on the obeliſks mentioned by Caſſiodorus, ſo often quoted, were certainly engraved in the ſacred character; and the character in which they were drawn was that above mentioned. If the ſacred letters were Chaldaic, the ſacred language was probably the ſame.

The Egyptians pretended, that the Babylonians derived the knowledge of the arts and ſciences from them; while, on the other hand, the Babylonians maintained, that the former had been tutored by them. The fact is, they both ſpoke the ſame language; and the two [illegible] had [illegible] with equal [illegible] in [illegible], aſtronomy, geometry, arithmetic, and the other [illegible]

Chaldean Language, &c.

ſciences; of courſe a rivalſhip had ariſen between the two nations, which laid the foundation of thoſe oppoſite pretenſions.

The moſt faithful ſpecimen of the vulgar language of the Egyptians, is, we believe, ſtill preſerved in the Coptic, which, however, is ſo replete with Greciſms, that it muſt be difficult to trace it out.

Under the Ptolemies, the Greek was the language of the court, and conſequently muſt have diffuſed itſelf over all the country. Hence, we believe, two-thirds of the Coptic are Greek words, diverſified by their terminations, declenſions, and conjugations only. To be convinced of the truth of this, our learned and curious readers need only conſult Chriſtian Scholtz's Egyptian and Coptic grammar and dictionary, corrected and publiſhed by Godfred Woide, Oxford, 1788.

74 The Egyptian and Phœnician languages the ſame.

The Egyptians and Phœnicians were in a manner couſin-germans, and conſequently muſt have ſpoken the ſame language; that is, one of the ſiſter dialects of the Hebrew, Chaldean, Arabian, Cuſhite, &c.—This is not a mere conjecture; it may be realized by almoſt numberleſs examples. It is true, that when Joſeph's brethren went down to Egypt, and that ruler deigned to converſe with them, they could not underſtand the Egyptian idiom which he ſpoke; nor would he, had he been actually an Egyptian, have underſtood them without an interpreter. The only concluſion from this circumſtance is, that by this time the Egyptian had deviated conſiderably from the original language of mankind. The Iriſh and Welch, every body knows, are only different dialects of the Celtic tongue; and yet experience proves, that a native of Ireland and another of Wales cannot well comprehend each other's language, nor converſe intelligibly without an interpreter. The Erſe, ſpoken in the Highlands of Scotland, and the Iriſh, are known to be both branches of the old Celtic; yet a Scotch Highlander and an Iriſhman can hardly underſtand each other's ſpeech. By a parity of reaſon, a Hebrew and an Egyptian might, in the age of Joſeph, ſpeak only different dialects of the ſame original tongue, and yet find it difficult to underſtand one another. The fact ſeems to be, the Hebrew dialect had been in a manner ſtationary, from the migration of Abraham to that period; whereas the Egyptian, being ſpoken by a powerful, civilized, and highly cultivated people, muſt have received many improvements, perhaps additions, in the courſe of near two centuries.

75 The vulgar letters of Egypt nearly the ſame with, the Hebrew or Phœnician.

The deſcendants of Canaan and of Mizraim were ſtrictly connected in their religious ceremonies: they worſhipped the ſame objects, namely, the *Hoſt of Heaven;* they mourned *Oſiris* and *Adonis* in concert; they carried on a joint commerce, and, we think, ſpoke the ſame language; we may, therefore, conclude, that their vulgar letters were nearly the ſame, both in form, diſpoſition, and number. Their original number was probably 16, viz. five vowels, ſix mutes, ſimple and middle, four liquids, and the ſolitary σ.—With theſe, it is likely, was joined a mark of aſpiration, or an *h*, ſuch as we have in the Roman alphabet, and find on ſome Greek monuments. Cadmus was originally an Egyptian; that leader brought a new ſet of letters into Greece. Theſe are generally deemed to be Phœnician. They were nearly the ſame with the ancient Pelaſgic, as will be ſhown in the ſection of the *Greek language.* The latter, we think, were from Egypt, and conſequently the former muſt have been from the ſame quarter. Danaus, Perſeus, Lelex, &c. were of Egyptian extraction: they too adopted the Cadmean characters, without ſubſtituting any of their own.

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The Jonim, or Ionians, emigrated from Gaza, a colony of Egyptians; and their letters are known to have differed very little from thoſe of Cadmus and the Pelaſgi. The concluſion, therefore, is, that the vulgar Egyptian letters were the ſame with the Phœnician.

We are abundantly ſenſible that there are found upon Egyptian monuments characters altogether different from thoſe we have been deſcribing. At what time, by what people, and to what language, theſe letters belonged, we will not pretend to determine. The Ethiopians, the Chaldeans, the Perſians, the Greeks, the Romans, the Saracens, have, at different times, been ſovereigns of that unhappy country. Perhaps other nations, whoſe memory is now buried in oblivion, may have erected monuments, and covered them with inſcriptions compoſed of words taken from different languages, perhaps, upon ſome occaſions, whimſically deviſed, with a view to perplex the curious antiquaries of future ages. Some of theſe are compoſed of hieroglyphics intermingled with alphabetical characters, artificially deranged, in order to render them unintelligible. Theſe we do not pretend to develope; becauſe the moſt inquiſitive and ſagacious antiquaries are not yet agreed as to their purport and ſignification.

76 Egyptian names of Hebrew original,

We ſhall now go on to ſhow, that moſt part of the names of perſons and places, &c. which have been conveyed down to us, may, in general, be reduced to a Hebrew, Phœnician, Syrian, or Chaldean original. As the firſt of theſe languages is moſt generally known, we ſhall employ it as our arch-type or ſtandard, beginning with thoſe terms which occur in Scripture.

The word *Pharaoh*, the title of the *melech* or king of Egypt, is, we think, compounded of two terms, which plainly diſcover a Hebrew original. According to an oriental tradition, the firſt who aſſumed this title was the ſovereign of the *royal ſhepherds;* a race of people from Arabia and Phœnicia. They conquered Egypt at an early period, and kept poſſeſſion of it for ſeveral centuries. They gloried in the title ὑκσοι, or ὑκουσοι, which, according to Joſephus *contra Apion.* ſignifies "royal ſhepherds." The word *Pharaoh* ſeems to be compounded of פך *Phar*, "a bullock," and רעת, *Rachah*, "to feed;" hence פרעת *Pharachah*, as we think it ought to be written. The name given to Joſeph is evidently of kin with the Hebrew; for *zaphnath* differs very little from the Hebrew verb *tzaphan*, which ſignifies "to hide, to keep ſecret;" *Paneah* or *Phaneah*, ſignifies much the ſame with the Hebrew *Phanah*, aſpexit: ſo that the name actually intimates *one* who ſees hidden things; which was certainly the very idea the prince intended to convey by giving him that name.

Potiphar, or *Potipherah*, the name of Joſeph's father-in-law, has likewiſe a dialectical affinity with the Hebrew idiom. In that language *Patah* ſignifies "to open, to explain," which was one part of the ſacerdotal office; and *Phar* imports "a bullock." Potiphar was then

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then prieſt of the bullock, that is, the ox, *apis*, ſacred to the *ſun* (1). This perſon was prieſt or *prince of On*, which, according to Cyrillus on Hoſea, was an Egyptian name of that luminary. The Hebrew word *hon* or *chon* ſignifies "power, wealth, ſufficiency;" a very proper epithet for the *ſun*, who was thought to beſtow thoſe bleſſings. The name of Joſeph's wife was *Aſenath* or *Aſnath*, compounded of *Iſhah* "a woman," and *Naith* or *Neit*, an Egyptian name of "Minerva, a votary of Minerva."

Almoſt all the names of cities belonging to Egypt which are mentioned in Scripture are evidently Hebrew. To be ſatisfied as to this poſition, our curious readers may conſult Jamieſon's *Spicilegia*, an excellent book very little known. The names of moſt of the Egyptian deities are ſignificant in the Hebrew tongue; and in that dialect the names appear to have been impoſed with great judgement and propriety, plainly indicating ſome office aſſigned them, or pointing to ſome peculiar attribute. We ſhall produce a few inſtances.

77 And ſignificant in that language.

Oſiris was the great divinity of Egypt; he was certainly the *ſun*. The Egyptians gave their deities a variety of names in alluſion to their various offices and attributes. Jablonſki has in a manner wearied himſelf with tracing the ſignification of this name. In Hebrew we have *Oſhir* "to grow rich, to be enriched." The ſun may be called the great enricher of nature, and therefore might properly be called by a name alluding to that quality. *Iſis* was both the moon and the earth. *Iſhah* is the Hebrew word for *woman*, and Horapollo aſſigns this very derivation. *Anubis* was one of the names of Mercury among the Egyptians: He was always figured with the head of a *dog*. He accompanied *Iſis* in her peregrinations in queſt of Oſiris, and frighted away the wild beaſts from attacking the princeſs. In Hebrew, *Nubah* ſignifies "to bark." Here the analogy, we think, is evident. Many Egyptian names begin with *Can*, ſuch as *Canobus*, *Canopus*, &c. The Hebrew word *Cahen* or *Cohen*, Syr. *Con* or *Chon*, intimates both a prince and a prieſt. *Ob* or *Aub*, in Hebrew, imports "a bottle, a flaggon," any thing round and prominent like the human belly. In the language of Egypt it was often applied to the ſun, in alluſion to his rotundity. In the temple of *Jupiter Ammon* or *Amon*, in the deſert of Libya, there was a ſtatue of the god repreſenting the *navel* of the human body, which was probably framed in alluſion to this fancy. Hence the Pythoneſs, or people who, according to the Scripture, had familiar ſpirits, were ſaid to prophecy by the inſpiration of *Ob*, as the Delphic prieſteſs did by that of Apollo. Again, many Egyptian names end with *ſiris*, as Calaſiris, Termoſiris. This termination is no doubt a cognate of the Hebrew and Chaldean *ſar* or *zar*, ſignifying "a prince, or grandee, &c." The river Nile in the Ethiopic dialect is called *Siris*; that is, we believe, the *king of rivers*. The ſame flood ſeems to derive the name by which it is generally known, from the Hebrew *nehel*, "a valley, or torrent running down a valley." The ſame river was often called *Oceanus*, a word compoſed of *og*, or *oc*, or *och*, which ſignifies "a king, a leader," and the Hebrew *oin*, "a fountain;" ſo that the word imports the *king of fountains*. The Hebrews always denominated the land of Egypt the land of Mizraim; the Egyptians themſelves, in later times, ſeemed to have called it Αιγυπτος, *Ægyptus*, "Egypt," which ſome think is compounded of *Ai*, Hebrew, "an iſland, a country, a province," and *Copt* or *Cupt*, "a famous city in that country."

From this ſpecimen, we hope it will appear that the Egyptian language in the more early ages was one of thoſe dialects into which that of the deſcendants of the poſtdiluvian patriarchs was divided, and perhaps ſubdivided, a few centuries after the deluge. Among all thoſe, we believe, ſuch an affinity will be found, as plainly demonſtrates that they originally ſprung from one common ſtock. Here we might eaſily follow the Egyptian language into Greece; and there we are perſuaded we might trace a vaſt number of Egyptian terms into that tongue, which, however, the nature of this inquiry will not permit. If our learned readers ſhould incline to know more of the affinity of the Egyptian tongue with the others ſo often mentioned, they may conſult Bochart's *Chanaan*, Walton's *Proleg.* Gebelin's *Monde Prim.* Jamieſon's *Spicilegia*, &c.

Sect. IV. *Of the Perſian Language.*

The Perſian language is divided into the ancient and modern; the former of which is at this day very imperfectly known, the latter is at preſent one of the moſt expreſſive, and at the ſame time one of the moſt highly poliſhed, in the world. We ſhall, in treating of this language, in compliance with the plan we have all along followed, begin with the ancient.

78 At the birth of Mohammed two languages prevalent in Perſia.

When Mohammed was born, and Anu'shi'rava'n, whom he calls the *juſt king*, ſat on the throne of Perſia, two languages were generally prevalent in that empire (k). The one was called *Deri*, and was the dialect of the court, being only a refined and elegant branch of the *Parſi*, ſo called from the province of which *Shiraz* is now the capital; and that of the learned, in which moſt books were compoſed, and which had the name of *Pahlavi*, either from the heroes who ſpoke it in former times, or from *pahlu*, a tract of land which included ſome conſiderable cities of *Iran*: The ruder dialects of both were ſpoken by the ruſtics of ſeveral provinces; and many of theſe diſtinct idioms were vernacular, as happens in every kingdom of conſiderable extent. Beſides the *Parſi* and *Pahlavi*, a very ancient and abſtruſe tongue was known to the prieſts and philoſophers, called the language of the *Zend*, becauſe a book on religious and moral duties which they held ſacred, and which bore that name, had been written in it; while the *Pazend* or comment on that work was compoſed in *Pahlavi*, as a more popular dialect. The letters of this book were called *zend*, and the language *aveſta*.

79 And a more ancient one than either [illegible]

The *Zend* and the old *Pahlavi* are now almoſt extinct in *Iran*, and very few even of the Guebres can read it; while the *Parſi* remaining almoſt pure in *Shahnamah*,

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(1) The Septuagint (Gen. xli. v. 45. and 50.) tranſlate *On* by Ἡλιόπολις.

(k) The moderns call the empire of Perſia *Iran*; a name unknown to the ancients.

les, by the intermixture of Arabic words, and many imperceptible changes, now become a new language, exquiſitely poliſhed by a ſeries of fine writers both in proſe and verſe, analogous to the different idioms gradually formed in Europe after the ſubverſion of the Roman empire.

80
Parſi language, and

The very learned and laborious Sir William Jones is confident that the *Perſi* abounds with words from the Sanſcrit, with no other change than ſuch as may be obſerved in the numerous dialects of India; that very many Perſian imperatives are the roots of Sanſcrit verbs; and that even the moods and tenſes of the Perſian verb ſubſtantive, which is the model of all the reſt, are deducible from the Sanſcrit by an eaſy and clear analogy. From this he infers that the *Parſi*, like the various idiom dialects, is derived from the language of the Bramins. This concluſion, we imagine, is not altogether juſt, ſince by the ſame train of reaſoning we may infer that the Sanſcrit is derived from the *Parſi*.

The ſame learned gentleman adds, that the multitude of compounds in the Perſian language proves that it is not of Arabic but Indian original. This is undoubtedly true; but though the *Parſi* is not of Arabic original, it does not neceſſarily follow that it is of Sanſcrit. We might with the ſame propriety, and with an equal ſhow of reaſon, conclude, that the Greek language is deſcended of the Sanſcrit, becauſe it too abounds with compounds. We may then reſt aſſured, that neither the one nor the other argument adduced by the ingenious preſident proves that the *Parſi* tongue is a deſcendant of the Sanſcrit.

The gentleman ſo often mentioned, aſſures us, that the Zend bears a ſtrong reſemblance to the Sanſcrit; which, however, it might do without being actually derived from it, ſince we believe every oriental ſcholar will find that all the languages from the Mediterranean to the utmoſt coaſt of Hindoſtan exhibit very ſtrong ſignatures of a common original. The Parſi, however, not being the original dialect of Iran or Perſia, we ſhall purſue it no farther at preſent, but return to give ſome account of the Pahlavi, which was probably the primitive language of the country. We have obſerved above, that the Pazend or comment on the Zend was compoſed in the Pahlavi for the uſe of the vulgar. This, according to Sir William, was a dialect of the Chaldaic; and of this aſſertion he exhibits the following proof.

81
the Pahlavi,

By the nature of the Chaldean tongue, moſt words ended in the firſt long vowel, like *ſhemaiá*, "heaven;" and that very word, unaltered in a ſingle letter, we find in the Pàzend, together with *lailiá*, "night," *meyá*, "water," *nírá*, "fire," *matrá*, "rain," and a multitude of others, all Arabic or Hebrew, with a Chaldean termination; ſo *zamar*, by a beautiful metaphor from *pruning trees*, means in Hebrew to *compoſe verſes*, and thence, by an eaſy tranſition, to *ſing* them; now in Pahlavi we ſee the verb *zamarúniten*, "to ſing," with its forms *zamaraunemi*, "I ſing," and *zamzunid*, "he ſang;" the verbal terminations of the Perſian being added to the Chaldaic root. All theſe words are integral parts of the language; not adventitious like the Arabic nouns and verbals engrafted on the modern Perſian.

From this reaſoning it plainly appears, 1ſt, That Pahlavi was the ancient language of Perſia; and, 2d, That the ancient Perſian was a cognate dialect of the Chaldean, Hebrew, Arabic, Phœnician, &c. M. Anquetil has annexed to his tranſlation of the *Zendaveſta* two vocabularies in Zend and Pahlavi, which he found in an approved collection of *Rawayat* or *Traditional Pieces* in modern Perſian. His vocabulary of the Pahlavi ſtrongly confirms this opinion concerning the Chaldaic origin of that language. But with reſpect to the Zend, it abounded with vaſt numbers of pure Sanſcrit words, to ſuch a degree, that ſix or ſeven words in ten belonged to that language.

82
derived from Chaldaic and Sanſcrit, &c.

From this deduction it would appear, that the oldeſt languages of Perſia were Chaldaic and Sanſcrit: and that when they had ceaſed to be vernacular, the Pahlavi and Zend were deduced from them reſpectively, and the Parſi either from the Zend, or immediately from the dialect of the Brahmans: but all had perhaps a mixture of Tartarian; for the beſt lexicographers aſſert, that numberleſs words in ancient Perſian are taken from the Cimmerians. With reſpect to the laſt of theſe, we cannot help being of opinion, that colonies of people from the neighbourhood of Perſia did tranſport themſelves into Crim Tartary, and perhaps into Europe. Theſe coloniſts brought along with them thoſe vocables which ſtill occur in their dialect. Emigrants from thoſe quarters muſt have found their way into Scandinavia, ſince numberleſs Perſian words are ſtill current in thoſe regions. Perhaps Odin and his followers emigrated from the neighbourhood of Media and Perſia, and brought with them the dialect of the nations from whoſe country they had taken their departure.

83
The Zend from the ſame ſource.

With reſpect to the Zend, it might well be a dialect of the Sanſcrit, and was probably a ſacred language; and if ſo, concealed from the vulgar, and reſerved for the offices of religion. If Zoroaſtres, or Zaratuſht as the orientals call him, travelled into Egypt, and was initiated in the myſteries of the Egyptian religion, as ſome pretend he was, he might be inſtructed in the ſacred dialect of that people by the prieſts under whom he ſtudied. When that philoſopher returned into Perſia, and became the apoſtle of a new religion, he might compoſe the volume of his laws and religious inſtitutions in the ſacred language of his Egyptian tutors. This language then became that of the Magi, who concealed it carefully from the knowledge of the uninitiated, as the prieſts did in Egypt and the Brahmans in Hindoſtan.

In our Section on the *Sanſcrit* language, we ſhall give a detail of a number of particulars, which to us ſeem to furniſh a preſumption that the language in queſtion was imported from Egypt into Hindoſtan. We confeſs there are not ſufficient data to improve theſe preſumptions into abſolute certainty; but we hope the time is at hand when the worthy members of the Aſiatic Society will diſcover abundant materials to aſcertain the truth of this poſition. We are the rather inclined to adopt this hypotheſis, when we conſider the character of Zoroaſtres in connection with that of the Egyptian Cohens and of the Indian Brahmans.

If this opinion ſhould one day appear to be well-founded, we believe the coincidence between the language of the Zend and the Sanſcrit will be eaſily accounted for, without making the Hindoos maſters of Iran or Perſia, and then driving them back to the ſhores of the Ganges. That the nations of Turan or Scythia did actually overrun that country, and make themſelves maſters of a conſiderable part of it at different times, is vouched by the records and traditions of the Perſians themſelves. Upon thoſe occaſions a number of Tartarian words might be introduced into the country, and acquire a currency among the inhabitants. As the annals of ancient Perſia have been long ſince deſtroyed and conſigned to eternal oblivion, it is impoſſible to aſcertain either the extent or duration of theſe irruptions. Indeed the nature of our deſign does not call for that inveſtigation.

84
Proofs from Scripture of the origin of the Pahlavi.

In order to corroborate the cognation between the Chaldean and Pahlavi languages, we ſhall ſubjoin a few arguments derived from the Moſaic hiſtory, and the other writings of the Old Teſtament. Theſe we believe will be admitted as irrefragable proofs of the poſition above advanced by ſuch as admit the authenticity of thoſe records.

Elam is always allowed to have been the progenitor of the Perſians. This patriarch was the eldeſt ſon of Shem the ſon of Noah; and according to the Moſaic account, his poſterity ſettled in the neighbourhood of the deſcendants of Aſhur, Arphaxad, Lud, and Aram, the other ſons of Shem. The country where they ſettled was denominated *Elymaïs* *, as late as the beginning of the Chriſtian era. This name was retained till the Saracens conquered and took poſſeſſion of that country. If this was the caſe, as it certainly was, the Elamites or Perſians ſpoke a dialect of the primary language, which, in the firſt Section, we have proved to have been the Hebrew.

When the four eaſtern monarchs invaded the five cities of the plain in Canaan †, Chedorlaomer king of Elam was at the head of the confederacy. Amraphel king of Shinar, that is Babylon or Chaldea, was one of the allies; Arioch king of Elaſar was another; and Tidal, king of ſome ſcattered nations in the ſame neighbourhood, was the fourth. That Chedorlaomer was principal in this expedition, is obvious from the hiſtorian's detail of the ſecond, where that prince is placed firſt, and the reſt are named *the kings that were with him*. This paſſage likewiſe demonſtrates, that Elam, Shinar, and Elaſar, lay contiguous, and were engaged in the ſame cauſe. Wherever the country in queſtion is mentioned in Scripture prior to the era of Daniel and Ezra, it is always under the name of *Elam*. To go about to prove this would be ſuperfluous.

According to Xenophon ‡, the Perſians knew nothing of horſemanſhip before the age of Cyrus; but that hiſtorian informs us, that after that monarch had introduced the practice of fighting on horſeback, they became ſo fond of it, that no man of rank would deign to fight on foot. Here it ought to be conſidered, that the hiſtorian above mentioned was now writing a moral, military, and political romance; and therefore introduces this anecdote, in order to exalt the character of his hero: ſo that we are not to ſuppoſe that the people under conſideration were unacquainted with the art of horſemanſhip till that period.

The very name *Phars* or *Pharas* is certainly of Hebrew origin, and alludes to the ſkill that people profeſſed in horſemanſhip. The original ſeems to be *Pharſah*, *ungula*, "a hoof;" and in the Arabic *Pharas* intimates a *horſe*, and *Pharis* a *horſeman*. Conſequently the people were denominated *Parſai*, and the country *Pars*, becauſe they were trained from their infancy to ride the *great horſe*, which indeed they deemed their greateſt honour. This name was perhaps firſt impoſed upon them by the neighbouring nations, and in proceſs of time became their gentile appellation. *Mithras* is generally known to have been the chief divinity of the Perſians; a name which is plainly derived from *Mither*, "great." We find in Strabo the Perſian god *Amanus*, which is plainly a cognate of *Hamah*, the "ſun or fire." Hence we believe comes *Hamanim*, the "hearths or chapels" where the fire ſacred to the ſun was kept burning; which, we believe, the Greeks called Πυραθεια, or "fire-temples." Herodotus * mentions a cuſtom among the Perſians, according to which, when they came to engage an enemy, they caſt a rope with a kind of gin at the end of it on their enemy, and by thoſe means endeavoured to entangle and draw him into their power. The people of Perſia who employed this net or gin were called *Sagartii*, from *ſarag*, *ſharag*, or *ſrg*, a word which in Hebrew, Arabic, and Chaldaic, ſignifies to "hamper or entangle:" hence perhaps the Greek word Σαργανη, a "baſket or net." *Sar* or *zar* in Hebrew, Phœnician, Syriac, &c. ſignifies "a lord, a prince;" and hence we have the initial ſyllable of the far-famed *zar-tuſht*, *Zoroaſtres*. In a word, moſt of the Perſian names that occur in the Grecian hiſtories, notwithſtanding the ſcandalous manner in which they have been diſguiſed and metamorphoſed by the Greeks, may ſtill with a little ſkill and induſtry be traced back to a Hebrew, Chaldaic, Syriac, or Phœnician origin. In the books of Daniel, Ezra, Nehemiah, and Eſther, we find a number of Perſian names which are all of a Hebrew or Chaldaic complexion: to inveſtigate theſe at much greater length would be foreign to the deſign of the preſent article. If our curious reader ſhould incline to be more fully ſatisfied as to this point, he may conſult Bochart's *Chanaan*, D'Herbelot's *Bib. Orient.* Walton's *Proleg.* &c.

It now appears, we hope, to the entire ſatisfaction of our readers, that the Pahlavi is a remnant of the old Perſian, and that the latter is a cognate branch of the Hebrew, Chaldaic, Syriac, &c. We have likewiſe adduced ſome preſumptive proofs that the Zend was copied from the ſacred language of the Egyptians: we ſhall now endeavour to explain by what changes and revolutions the language firſt mentioned arrived at its preſent ſummit of beauty and perfection.

85
Progreſs of the Perſian language.

We have obſerved above, that the Scythians, whom the old Perſians called Σακαι, *Sacæ*, and whom the moderns call *Turan*, often invaded and overran Perſia at a very early period. The conſequence was, an infuſion of Scythian or Tartarian terms, with which that language was early impregnated. This in all probability occaſioned the firſt deviation from the original ſtandard. The conqueſts of Alexander, and the dominion of his ſucceſſors, muſt, one would imagine, introduce an inundation of Greek words. That event, however, ſeems to have affected the language in no conſiderable degree, at leaſt very few Grecian terms occur in the modern Perſian.

The empire of the *Arſacidæ* or Parthians, we apprehend, produced a very important alteration upon the ancient Perſian. They were a demi-Scythian tribe; and as they conquered the Perſians, retained the dominion of thoſe parts for ſeveral centuries, and actually incorpo-

* Strabo, lib. 11.

† Gen. chap. xiv.

‡ Cyrop. lib. 1.

* Lib. 4, cap. 85.

rated with the natives, their language muſt neceſſarily have given a deep tincture to the original dialect of the Perſians. Sir William Jones has obſerved, that the letters of the inſcriptions at *Iſtakhr* or Perſepolis bear ſome reſemblance to the old Runic letters of the Scandinavians. Thoſe inſcriptions we take to have been Parthian; and we hope, as the Parthians were a Tartarian clan, this conjecture may be admitted till another more plauſible is diſcovered. The Perſians, it is true, did once more recover the empire; and under them began the reign of the Deri and Parſi tongues: the former conſiſting of the old Perſian and Parthian highly poliſhed; the latter of the ſame languages in their uncultivated vernacular dreſs. In this ſituation the Perſian language remained till the invaſion of the Saracens in 636; when theſe barbarians overran and ſettled in that fine country; demoliſhed every monument of antiquity, records, temples, palaces, every remain of ancient ſuperſtition; maſſacred or expelled the miniſters of the Magian idolatry; and introduced a language, though not entirely new, yet widely differing from the old exemplar.

But before we proceed to give ſome brief account of the modern Perſian, we muſt take the liberty to hazard one conjecture, which perhaps our adepts in modern Perſian may not find themſelves diſpoſed to admit. In modern Perſian we find the ancient Perſian names wonderfully diſtorted and deflected from that form under which they appear in the Scripture, in Cteſias, Megaſthenes, and the other Greek authors. From this it has been inferred, that not only the Greeks, but even the ſacred hiſtorians of the Jews, have changed and metamorphoſed them moſt unmercifully, in order to accommodate them to the ſtandard of their own language. As to the Greeks, we know it was their conſtant practice, but we cannot believe ſo much of the Hebrews. We make no doubt of their writing and pronouncing the names of the Perſian monarchs and governors of that nation nearly in the ſame manner with the native Perſians. It is manifeſt, beyond all poſſibility of contradiction, that they neither altered the Tyrian and Phœnician names of perſons and places when they had occaſion to mention them, nor thoſe of the Egyptians when they occurred in their writings. The Babylonian and Chaldaic names which are mentioned in the Old Teſtament vary nothing from the Chaldean original. No reaſon can be aſſigned why they ſhould have transformed the Perſian names more than the others. On the contrary, in Ezra, Nehemiah, and Eſther, we find the Perſian names faithfully preſerved throughout.

86
Nothing now exiſting in Perſic, except the Zend, older than the Saracen conqueſt.

The fact, we imagine, is this: Our modern admirers of the Perſic have borrowed their names of the ancient kings and heroes of that country from romances and fabulous legends of more modern date and compoſition. The archives of Perſia were deſtroyed by the Saracens: nothing of importance was written in that country till two centuries after the era of Mohammed. What ſucceeded was all fiction and romance. The authors of thoſe entertaining compoſitions either forged names of heroes to anſwer their purpoſe, or laid hold on ſuch as were celebrated in the ballads of their country, or preſerved by vulgar tradition. The names were no doubt very different from thoſe of the ancient kings and heroes of Perſia; and probably many of them had undergone conſiderable changes during the continuance of the Parthian empire. Upon this foundation has the learned Mr Richardſon erected a very irregular fabric, new, and, to uſe his own expreſſion, we think built upon *pillars of ice*. He has taken much pains to invalidate the credit of the Grecian hiſtories of the Perſian empire, by drawing up in battle array againſt their records legions of romantic writers, who were not born till near 1000 years after the events had taken place; and to complete the probability, who lived 200 years after all the chronicles of the Medes and Perſians had been finally deſtroyed by the fury of the Saracens.

After the deciſive victory obtained over the Perſians at Kadeſſa, their ancient government was overturned, their religion proſcribed, their laws trampled under foot, and their civil tranſactions diſturbed by the forcible introduction of the lunar for the ſolar kalendar; while, at the ſame time, their language became almoſt overwhelmed by an inundation of Arabic words; which from that period, religion, authority, and faſhion, incorporated with their idiom.

From the ſeventh till the tenth century the Perſian tongue, now impregnated with Arabic words, appears to have laboured under much diſcouragement and neglect. Bagdad, built by Almanſor, became ſoon after the year 762 the chief reſidence of the caliphs, and the general reſort of the learned and the ambitious from every quarter of the empire. At length the acceſſion of the Buyah princes to the Perſian throne marked in the tenth century the great epoch of the revival of Perſian learning. About the year 977 the throne of Perſia was filled by the great Azaduddawla; who firſt aſſumed the title of *Sultan*, afterwards generally adopted by eaſtern princes. He was born in Iſpahan, and had a ſtrong attachment to his native kingdom. His court, whether at Bagdad or in the capital of Perſia, was the ſtandard of taſte and the favourite reſidence of genius. The native dialect of the prince was particularly diſtinguiſhed, and became ſoon the general language of compoſition in almoſt every branch of polite learning. From the end of the tenth till the 15th century may be conſidered as the moſt flouriſhing period of Perſian literature. The epic poet Firdauſi, in his romantic hiſtory of the Perſian kings and heroes, diſplays an imagination and ſmoothneſs of numbers hardly inferior to Homer. The whole fanciful range of Perſian enchantment he has interwoven in his poems, which abound with the nobleſt efforts of genius. This bard has ſtamped a dignity on the monſters and fictions of the eaſt, equal to that which the prince of epic poetry has given to the mythology of ancient Greece. His language may at the ſame time be conſidered as the moſt refined dialect of the ancient Perſian, the Arabic being introduced with a very ſparing hand: whilſt Sadi, Jami, Hafiz, and other ſucceeding writers, in proſe as well as verſe, have blended in their works the Arabic without reſerve; gaining perhaps in the nervous luxuriance of the one language what may ſeem to have been loſt in the ſofter delicacy of the other. Hence Ebn Fekreddin Anju, in the preface to the dictionary called *Farhang Jehanguiri*, ſays, that the Deri and the Arabic idioms were the languages of heaven; God communicating to the angels his milder mandates in the delicate accents of the firſt, while his ſtern commands were delivered in the rapid accents of the laſt.

87
The moſt flouriſhing period of Perſian literature.

For near 300 years the literary fire of the Perſians ſeems indeed to have been almoſt extinguiſhed, ſince, during that time, hardly any thing of that people which deſerves attention has appeared in Europe: enough, however, has already been produced, to inſpire us with a very high opinion of the genius of the eaſt. In taſte, the orientals are undoubtedly inferior to the beſt writers of modern Europe; but in invention and ſublimity, they are excelled, perhaps equalled, by none. The Perſians affect a rhetorical luxuriance, which to a European wears the air of unneceſſary redundance. If to theſe leading diſtinctions we add a peculiar tone of imagery, of metaphor, of alluſion, derived from the difference of government, of manners, of temperament, and of ſuch natural objects as characteriſe Aſia from Europe; we ſhall ſee, at one view, the great points of variation between the writers of the eaſt and weſt. Amongſt the oriental hiſtorians, philoſophers, rhetoricians, and poets, many will be found who would do honour to any age or people; whilſt their romances, their tales, and their fables, ſtand upon a ground which Europeans have not yet found powers to reach. We might here quote the Arabian Nights Entertainments, Perſian Tales, Pilpay's Fables, &c.

88
The genius of the modern Perſic.

We ſhall now annex a few ſtrictures on the genius of that noble language; though it is our opinion that the province of the philologiſt is to inveſtigate the origin, progreſs, and final improvement of a language, without deſcending to its grammatical minutiæ or peculiar idiomatic diſtinctions. We have already obſerved, that the tongue under conſideration is partly Arabic and partly Perſian, though the latter generally has the aſcendant. The former is nervous, impetuous, and maſculine; the latter is flowing, ſoft, and luxuriant. Wherever the Arabic letters do not readily incorporate with the Perſian, they are either changed into others or thrown away. Their letters are the Arabic with little variation; theſe being found more commodious and expeditious than the old letters of the Deri and Parſi. Their alphabet conſiſts of 32 letters, which, like the Arabic, are read from right to left; their form and order will be learned from any grammar of that language. The letters are divided into vowels and conſonants as uſual. The Arabic characters, like thoſe of the Europeans, are written in a variety of different hands; but the Perſians write their poetical works in the Talick, which anſwers to the moſt elegant of our Italic hands.

89
Reſemblance between Perſian and Engliſh.

There is a great reſemblance between the Perſian and Engliſh languages in the facility and ſimplicity of their form and conſtruction: the former, as well as the latter, has no difference of terminations to mark the gender either in ſubſtantives or adjectives; all inanimate things are neuter; and animals of different ſexes have either different names, or are diſtinguiſhed by the words *ner* male, and *made* female. Sometimes indeed a word is made feminine, after the manner of the Arabians, by having *a* added to it.

The Perſian ſubſtantives have but one variation of caſe, which is formed by adding a ſyllable to the nominative in both numbers; and anſwers often to the dative, but generally to the accuſative, caſe in other languages. The other caſes are expreſſed for the moſt part by particles placed before the nominative. The Perſians have two numbers, ſingular and plural; the latter is formed by adding a ſyllable to the former.

The Perſian adjectives admit of no variation but in the degrees of compariſon. The comparative is formed by adding *ter*, and the ſuperlative by adding *terin* to the poſitive.

The Perſians have active and neuter verbs like other nations; but many of their verbs have both an active and neuter ſenſe, which can be determined only by the conſtruction. Thoſe verbs have properly but one conjugation, and but three changes of tenſe: the imperative, the aoriſt, and the preterite; all the other tenſes being formed by the help of particles or of auxiliary verbs. The paſſive voice is formed by adding the tenſes of the ſubſtantive verb to the participle of the active.

In the ancient language of Perſia there were very few or no irregularities; the imperative, which is often irregular in the modern Perſian, was anciently formed from the infinitive, by rejecting the termination *eeden:* for originally all infinitives ended in *den*, till the Arabs introduced their harſh conſonants before that ſyllable, which obliged the Perſians, who always affected a ſweetneſs of pronunciation, to change the old termination of ſome verbs into *ten*, and by degrees the original infinitive grew quite obſolete; yet they ſtill retain the ancient imperative, and the aoriſts which are formed from it. This little irregularity is the only anomalous part of the Perſian language; which nevertheleſs far ſurpaſſes in ſimplicity all other languages ancient or modern.

With reſpect to the more minute and intricate parts of this language, as well as its derivations, compoſitions, conſtructions, &c. we muſt remit our readers to Mininſki's *Inſtitutiones Linguæ Turcicæ, cum rudimentis parallelis linguarum Arab. et Perſ.*; Sir William Jones's Perſian Grammar; Mr Richardſon's Arabian and Perſian Dictionary; D. Herbelot's *Bibl. Orient.*; Dr Hyde *de Relig, vet. Perſ.* &c. Our readers, who would penetrate into the innermoſt receſſes of the Perſian hiſtory, colonies, antiquities, connections, dialects, may conſult the laſt mentioned author, eſpecially chap. xxxv. *De Perſia et Perſarum nominibus, et de moderna atque veteri lingua Perſica, ejuſque dialectis.* In the preceding inquiry we have followed other authors, whoſe accounts appeared to us more natural, and much leſs embarraſſing.

90
Utility of the Arabian and Perſian languages.

To conclude this ſection, which might eaſily have been extended into a large volume, we ſhall only take the liberty to put our readers in mind of the vaſt utility of the Arabian and Perſian languages. Numberleſs events are preſerved in the writings of the orientals which were never heard of in Europe, and muſt have for ever lain concealed from the knowledge of its inhabitants, had not theſe two tongues been ſtudied and underſtood by the natives of this quarter of the globe. Many of thoſe events have been tranſmitted to poſterity in poems and legendary tales like the Runic fragments of the north, the romances of Spain, or the heroic ballads of our own country. Such materials as theſe, we imagine, may have ſuggeſted to Firdauſi, the celebrated heroic poet of Perſia, many of the adventures of his *Shahnamé*; which, like Homer when ſtript of the machinery of ſupernatural beings, is ſuppoſed to contain much true hiſtory, and a moſt undoubted picture of the ſuperſtition and manners of the times. The knowledge of theſe two languages has laid open to Europe all the treaſures of oriental learning, and has enriched the minds of Britons with Indian ſcience as much as the produce of theſe regions has increaſed their wealth and enervated their conſtitution.

91 Perſian poetry.

Before we conclude this ſection, we ſhall ſubjoin a few ſtrictures on the nature of Perſian poetry, in order to render our inquiry the more complete. The modern Perſians borrowed their poetical meaſures from the Arabs: they are exceedingly various and complicated; they conſiſt of 19 different kinds; but the moſt common of them are the *Iambic* or *Trochaic* meaſure, and a metre that chiefly conſiſts of thoſe compounded feet which the ancients called Επιτριτȣς, which are compoſed of iambic and ſpondees alternately. In lyric poetry their verſes generally conſiſt of 12 or 16 ſyllables: they ſometimes, but ſeldom, conſiſt of 14. Some of their lyric verſes contain 13 ſyllables: but the moſt common Perſian verſe is made up of 11; and in this meaſure are written all their great poems, whether upon heroic or moral ſubjects, as the works of Firdauſi and Jami, the Boſtan of Sadi, and the Meſnavi of Gelaleddin. This ſort of verſe anſwers to our common heroic rhyme, which was brought to ſo high a degree of perfection by Pope. The ſtudy of the Perſian poetry is ſo much the more neceſſary, as there are few books or even letters written in that language, which are not interſperſed with fragments of poetry. As to their proſody, nothing can be more eaſy and ſimple. When the ſtudent can read proſe eaſily, he will with a little attention read poetry with equal facility.

SECT. V. *Sanſcrit and Bengaleſe Languages.*

92 The Sanſcrit one of the moſt ancient languages in the world.

THE Sanſcrit, though one of the moſt ancient languages in the world, was little known even in Aſia till about the middle of the preſent century. Since that period, by the indefatigable induſtry of the very learned and ingenious Sir William Jones and the other worthy members of that ſociety of which he has the honour to be preſident, that noble and ancient language has at length been brought to light; and from it vaſt treaſures of oriental knowledge will be communicated both to Europe and Aſia; knowledge which, without the exertions of that happy eſtabliſhment, muſt have lain concealed from the reſearches of mankind to the end of the world. In this ſection we propoſe to give to our readers ſuch an account of that language as the limits of the preſent article, and the helps we have been able to procure, ſhall permit.

The Sanſcrit language has for many centuries lain concealed in the hands of the bramins of Hindoſtan. It is by them deemed ſacred, and is of conſequence confined ſolely to the offices of religion. Its name imports the *perfect language*, or, according to the eaſtern ſtyle, *the language of perfection;* and we believe no language ever ſpoken by man is more juſtly intitled to that high epithet.

93 Traces of Sanſcrit in every diſtrict of Aſia and elſewhere.

The grand ſource of Indian literature, and the parent of almoſt every dialect from the Perſian gulf to the China ſeas, is the Sanſcrit; a language of the moſt venerable and moſt remote antiquity, which, though at preſent ſhut up in the libraries of the bramins, and appropriated ſolely to the records of the religion, appears to have been current over moſt of the oriental world. Accordingly traces of its original extent may be diſcovered in almoſt every diſtrict of Aſia. Thoſe who are acquainted with that language have often found the ſimilitude of Sanſcrit words to thoſe of Perſian and Arabic, and even of Latin and Greek; and that not in technical and metaphorical terms, which refined arts and improved manners might have occaſionally introduced, but in the main ground-work of language, in monoſyllables, the names of numbers, and appellations of ſuch things as would be firſt diſcriminated on the immediate drawn of civilization.

The ancient coins of many different and diſtant kingdoms of Aſia are ſtamped with Sanſcrit characters, and moſtly contain alluſions to the old Sanſcrit mythology. Beſides, in the names of perſons and places, of titles and dignities, which are open to general notice, even to the fartheſt limits of Aſia, may be found manifeſt traces of the Sanſcrit. The ſcanty remains of Coptic antiquities afford little ſcope for compariſon between that idiom and this primitive tongue; but there ſtill exiſts ſufficient ground to conjecture, that, at a very early period, a correſpondence did ſubſiſt between theſe two nations. The Hindoos pretend, that the Egyptians frequented their country as diſciples, not as inſtructors; that they came to ſeek that liberal education and thoſe ſciences in Hindoſtan, which none of their own countrymen had ſufficient knowledge to impart. Perhaps we may examine the validity of this claim hereafter.

94 Number of books in that language.

But though numberleſs changes and revolutions have from time to time convulſed Hindoſtan, that part of it which lies between the Indus and the Ganges ſtill preſerves that language whole and inviolate. Here they ſtill offer a thouſand books to the peruſal of the curious; many of which have been religiouſly handed down from the earlieſt periods of human exiſtence.

95 Characteriſtics of it.

The fundamental part of the Sanſcrit language is divided into three claſſes: *Dhaat*, or roots of verbs, which ſome call primitive elements; *Skubd*, or original nouns; and *Evya*, or particles. The latter are ever indeclinable, as in other languages; but the words comprehended in the two former claſſes muſt be prepared by certain additions and inflexions to fit them for a place in compoſition. And here it is that the art of the grammarian has found room to expand itſelf, and to employ all the powers of refinement. Not a ſyllable, not a letter, can be added or altered but by regimen; not the moſt trifling variation of the ſenſe, in the minuteſt ſubdiviſion of declenſion or conjugation, can be effected without the application of ſeveral rules: all the different forms for every change of gender, number, caſe, perſon, tenſe, mood, or degree, are methodically arranged for the aſſiſtance of the memory, according to an unerring ſcale. The number of the radical or elementary parts is about 700; and to theſe, as to the verbs of other languages, a very plentiful ſtock of verbal nouns owes its origin; but theſe are not thought to exceed thoſe of the Greek either in quantity or variety.

To the triple ſource of words mentioned above, every term of truly Indian original may be traced by a laborious and critical analyſis. All ſuch terms as are thoroughly proved to bear no relation to any one of the Sanſcrit roots, are conſidered as the production of ſome remote and foreign idiom, ſubſequently ingrafted upon the main ſtock; and it is conjectured, that a judicious inveſtigation of this principle would throw a new light

Sanscrit and Bengalese languages. light upon the first invention of many arts and sciences, and open a fresh mine of philological discoveries. We shall now proceed to give as exact an account of the constituent parts of this language as the nature of our design will permit.

96 It is copious and nervous. The Sanscrit language is very copious and nervous. The first of these qualities arises in a great measure from the vast number of compound words with which it is almost overstocked. "The Sanscrit (says Sir William Jones), like the Greek, Persian, and German, delights in compounds; but to a much higher degree, and indeed to such excess, that I could produce words of more than 20 syllables; not formed ludicrously like that by which the buffoon in Aristophanes describes a feast, but with perfect seriousness, on the most solemn occasions, and in the most elegant works." But the style of its best authors is wonderfully concise. In the regularity of its etymology it far exceeds the Greek and Arabic; and, like them, has a prodigious number of derivatives from each primary root. The grammatical rules also are numerous and difficult, though there are not many anomalies. As one instance of the truth of this assertion, it may be observed, that there are seven declensions of nouns, all used in the singular, the dual, and the plural numbers, and all of them differently formed, according as they terminate with a consonant, with a long or a short vowel; and again, different also as they are of different genders: not a nominative case can be formed to any one of these nouns without the application of at least four rules, which vary likewise with each particular difference of the nouns, as above stated: add to this, that every word in the language may be used through all the seven declensions, which is a full proof of the difficulty of the idiom.

The Sanscrit grammars are called *Beākeran*, of which there are many composed by different authors; some too abstruse even for the comprehension of most bramins, and others too prolix to be ever used as references. One of the shortest, named the *Sārăſootee*, contains between two and three hundred pages, and was compiled by Anoŏbhōōtēē Seroopĕnām Achārige, with a conciseness that can scarcely be paralleled in any other language.

97 Sanscrit alphabet. The Sanscrit alphabet contains 50 letters; and it is one boast of the bramins, that it exceeds all other alphabets in this respect: but it must be observed, that as of their 34 consonants, near half carry combined sounds, and that six of their vowels are merely the correspondent long ones to as many which are short, the advantage seems to be little more than fanciful. Besides these, they have a number of characters which Mr Halhed calls connected vowels, but which have not been explained by the learned president of the Asiatic Society.

*Plate CCCCXVI. The Sanscrit character used in Upper Hindostan * is said to be the same original letter that was first delivered to the people by Brahma, and is now called *Diewnāgur*, or the language of angels, which shows the high opinion that the bramins have entertained of that character. Their consonants and vowels are wonderfully, perhaps whimsically, modified and classified; to enumerate which, in this place, would contribute very little either to the entertainment or instruction of our readers. All their distinctions are marked in the *Beads* (1), and read or recited accordingly; so that they produce all the effect of a laboured recitative: but by an attention to the music of the chant, the sense of the passage recited escapes both the reader and the audience. It is remarkable, that the Jews in their synagogues chant the Pentateuch in the same kind of melody; and it is supposed that this usage has descended to them from the remotest ages.

98 Poetry. The Sanscrit poetry comprehends a very great variety of different metres, of which the most common are these.

The *moonee burrund chhund*, or line of 12 or 19 syllables, which is formed by three syllables in a foot, and the most approved foot is the anapæst.

The *cābee chhund*, or line of eleven syllables.

The *anŭſhtofe chhund*, or line of eight syllables.

The poems are generally composed in stanzas of four lines, called *ashlogues*, which are regular or irregular.

The most common ashlogue is that of the *anuſhtofe chhund*, or regular stanza of eight syllables in each line. In this measure the greatest part of the *Māhābāret* is composed. The rhyme in this kind of stanza should be alternate; but the poets do not seem to be very nice in the observance of a strict correspondence in the sounds of the terminating syllables, provided the feet of the verse are accurately kept.

This *anuſhtofe ashlogue* is generally written by two verses in one line, with a pause between; so the whole then assumes the form of a long distich.

The irregular stanza is constantly called *arjāchhund*, of whatever kind of irregularity it may happen to consist. It is most commonly compounded of the long line *cābee chhund* and the short *anuſhtofe chhund* alternately; in which form it bears some resemblance to the most common lyric measure of the English.

Perhaps our readers may feel a curiosity to be informed of the origin of this oriental tongue. If we believe the bramins themselves, it was coeval with the race of man, as was observed towards the beginning of this section. The bramins, however, are not the only people who ascribe a kind of eternity to their own particular dialect. We find that the Sanscrit in its primitive destination was appropriated to the offices of religion. It 99 Origin of this tongue. is indeed pretended, that all the other dialects spoken in Hindostan were emanations from that fountain, to which they might be traced back by a skilful etymologist. This, we think, is an argument of no great consequence, since we believe that all the languages of Europe, by the same process, may be deduced from any one of those current in that quarter of the globe. By a parity of reason, all the different dialects of Hindostan may be referred to the language in question. Indeed, if we admit the authority of the Mosaic history, all languages whatsoever are derived from that of the first man. It is allowed that the language under consideration is impregnated with Persian, Chaldaic, Phœnician, Greek, and

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(1) The books which contain the religion of the bramins.

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and even Latin idioms. This, we think, affords a preſumption that the Sanſcrit was one of thoſe original dialects which were gradually produced among the deſcendants of Noah, in proportion as they gradually receded from the centre of population. What branch or branches of that family emigrated to Hindoſtan, it is not eaſy to determine. That they were a party of the deſcendants of Shem is moſt probable, becauſe the other ſepts of his poſterity ſettled in that neighbourhood. The ſum then is, that the Hindoos were a colony conſiſting of the deſcendants of the patriarch Shem.

It appears, however, by almoſt numberleſs monuments of antiquity ſtill exiſting, that at a very early period a different race of men had obtained ſettlements in that country. It is now generally admitted, that colonies of Egyptians had peopled a conſiderable part of Hindoſtan. Numberleſs traces of their religion occur everywhere in thoſe regions. The very learned preſident himſelf is poſitive, that veſtiges of thoſe ſacerdotal wanderers are found in India, China, Japan, Tibet, and many parts of Tartary. Thoſe coloniſts, it is well known, were zealous in propagating their religious ceremonies wherever they reſided, and wherever they travelled. There is at the ſame time even at this day a ſtriking reſemblance between the ſacred rites of the vulgar Hindoos and thoſe of the ancient Egyptians. The prodigious ſtatues of Salſette and Elephanta fabricated in the Egyptian ſtyle; the vaſt excavations hewn out of the rock in the former; the wooly hair of the ſtatues, their diſtorted attitudes, their groteſque appearances, their triple heads, and various other configurations —plainly indicate a foreign original. Theſe phenomena ſuit no other people on earth ſo exactly as the ſons of Mizraim. The Egyptian prieſts uſed a ſacred character, which none knew but themſelves; none were allowed to learn except their children and the choice of the initiated. All theſe features mark an exact parallel with the bramins of the Hindoos. Add to this, that the dreſs, diet, luſtrations, and other rites of both ſects, bore an exact reſemblance to each other. Sir William Jones has juſtly obſerved, that the letters of the Sanſcrit, ſtript of all adventitious appendages, are really the ſquare Chaldaic characters. We learn from Caſſiodorus * the following particulars: "The height of the obeliſks is equal to that of the circus; now the higher is dedicated to the ſun, and the lower to the moon, where the ſacred rites of the ancients are intimated by Chaldaic ſignatures by way of letters." Here then it is plain that the ſacred letters of the Egyptians were Chaldaic, and it is allowed that thoſe of the bramins were of the ſame complexion; which affords a new preſumption of the identity of the Sanſcrit with thoſe juſt mentioned.

That the Egyptians had at a very early period penetrated into Hindoſtan, is univerſally admitted. Oſiris, their celebrated monarch and deity, according to their mythology, conducted an army into that country; taught the natives agriculture, laws, religion, and the culture of the vine, &c. He is ſaid at the ſame time to have left colonies of prieſts, as a kind of miſſionaries, to inſtruct the people in the ceremonies of religion. Seſoſtris, another Egyptian potentate, likewiſe overran Hindoſtan with an army, and taught the natives many uſeful arts and ſciences. When the paſtor-kings invaded and conquered Egypt, it is probable that numbers of the prieſts, in order to avoid the fury of the mercileſs invaders who demoliſhed the temples and perſecuted the miniſters of religion, left their native country, and tranſported themſelves into India. Theſe, we ſhould think, were the authors both of the language and religion of the bramins. This dialect, as imported by the Egyptians, was probably of the ſame contexture with the ſacred language of that people, as it appeared many ages after. The Indians, who have always been an inventive and induſtrious race of men, in proceſs of time cultivated, improved, diverſified, and conſtructed that language with ſuch care and aſſiduity, that it gradually arrived at that high degree of perfection in which at preſent it appears.

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Had the learned preſident of the Aſiatic Society (M), when he inſtituted a compariſon between the deities of Hindoſtan on the one ſide and of Greece and Italy on the other, examined the analogy between the gods of Hindoſtan and thoſe of Egypt, we think he would have performed a piece of ſervice ſtill more eminent. Having firſt demonſtrated the ſimilarity between the divinities of India and Egypt, he might then have proceeded to inveſtigate the reſemblance of the Egyptian and Phœnician with thoſe of Greece and Rome. By this proceſs a chain would have been formed which would have conducted his reader to comprehend at one view the identity of the Zabian worſhip almoſt throughout the world.

We foreſee that it will be objected to this hypotheſis, that all the dialects of Hindoſtan being clearly reducible to the Sanſcrit, it is altogether impoſſible that it could have been a foreign language. To this we anſwer, that at the early period when this event is ſuppoſed to have taken place, the language of the poſterity of the ſons of Noah had not deviated conſiderably from the primitive ſtandard, and conſequently the language of the Egyptians and the Hindoos was nearly the ſame. The Sanſcrit was gradually improved: the language of the vulgar, as is always the caſe, became more and more different from the original archetype; but ſtill retained ſuch a near reſemblance to the mother-tongue as proved the verity of its extraction.

100 Bengaleſe language derived from the Sanſcrit.

To the preceding account of the Sanſcrit language we ſhall annex a few ſtrictures on the language of Bengal, which we believe is derived from the other, and is in moſt common uſe in the ſouthern parts of Hindoſtan.

Though moſt of the ancient oriental tongues are read from right to left, like the Hebrew, Chaldaic, Arabic, &c. yet ſuch as properly belong to the whole continent of India proceed from left to right like thoſe of Europe. The Arabic, Perſian, &c. are the grand ſources whence the former method has been derived; but with theſe, the numerous original dialects of Hindoſtan have not the ſmalleſt connection or reſemblance.

The great number of letters, the complex mode of combination, and the difficulty of pronunciation, are conſiderable

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* Lib. iii. epiſt. 2. et 51.

(M) See that gentleman's diſcourſe, *Reſearches*, Vol. I.

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conſiderable impediments to the ſtudy of the Bengal language; and the careleſſneſs and ignorance of the people, and the inaccuracy of their characters, aggravate theſe inconveniences. Many of their characters are ſpurious; and theſe, by long uſe and the hurry of buſineſs, are now almoſt naturalized into the language.

101 Bengal alphabet. The Bengal alphabet, like that of the Sanſcrit, from which it is derived, conſiſts of 50 letters, whoſe form, order, and ſound, may be learned from Mr Halhed's grammar of the Bengal language. The vowels are divided into long and ſhort, the latter of which are often omitted in writing. Many of the oriental languages are conſtructed upon the ſame principle, with reſpect to the omiſſion of the ſhort vowel. The Hebrews had no ſign to expreſs it before the invention of the Maſoretic points; in Arabic it is rarely inſerted unleſs upon very ſolemn occaſions, as in the Koran; in the modern Perſian it is univerſally omitted: ſo to all the conſonants in the Sanſcrit, the ſhort vowel is an invariable appendage, and is never ſignified by any diacritical mark; but where the conſtruction requires that the vowel ſhould be dropped, a particular ſtroke is ſet under the letter. It is in vain to pretend, in a ſketch like this, to detail the ſound and pronunciation of theſe letters: this muſt be acquired by the ear and by practice.

102 Genders, &c. of this language. In the Bengal language there are three genders, as in Greek, Arabic, &c. The authors of this threefold diviſion of genders, with reſpect to their precedence, appear to have conſidered the neuter as a kind of reſiduum reſulting from the two others, and as leſs worthy or leſs comprehenſive than either (ſee Section of the *Greek.*) The terminations uſually applied upon this occaſion are *aa* for the maſculine, and *ee* for the feminine. In Sanſcrit, as in Greek and Latin, the names of all things inanimate have different genders, founded on vague and incomprehenſible diſtinctions: the ſame is the caſe with the Bengal.

103 Peculiarities of Sanſcrit and Bengaleſe nouns. A Sanſcrit noun, on its firſt formation from the general root, exiſts equally independent of caſe as of gender. It is neither nominative, nor genitive, nor accuſative; nor is impreſſed with any of thoſe modifications which mark the relation and connection between the ſeveral members of a ſentence. In this ſtate it is called an *imperfect* or *crude* noun. To make a nominative of a word, the termination muſt be changed and a new form ſupplied. Thus we ſee, that in the Sanſcrit, at leaſt, the nominative has an equal right with any other inflexion to be called a caſe. Every Sanſcrit noun has ſeven caſes, excluſive of the vocative; and therefore comprehends two more than even thoſe of the Latin. Mr Halhed above mentioned details all the varieties of theſe with great accuracy, to whoſe Grammar we muſt refer our readers. The Bengal has only four caſes beſide the vocative; in which reſpect it is much inferior to the other.

It would be difficult to account for the variety of words which have been allotted to the claſs of pronouns by European grammarians. The firſt and ſecond perſon are chiefly worthy of obſervation: theſe two ſhould ſeem to be confined to rational and converſable beings only: the third ſupplies the place of every object in nature; wherefore it muſt neceſſarily be endued with a capacity of ſhifting its gender reſpectively as it ſhifts the ſubject; and hence it is in Sanſcrit frequently denominated an adjective. One of the demonſtratives *sa* or *ſhe* uſually ſerves for this purpoſe, and generally the latter, which in Arabic has no other name than *zumeer el ghaeb*, "the pronoun of the abſent," for whoſe name it is a ſubſtitute.

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104 Bengaleſe pronouns. In moſt languages where the verb has a ſeparate inflection for each perſon, that inflection is ſufficient to aſcertain the perſonality; but in Bengal compoſitions, though the firſt and ſecond perſons occur very frequently, nothing is more rare than the uſage of the pronoun of the third; and names of perſons are inſerted with a conſtant and diſguſting repetition, to avoid, as it ſhould ſeem, the application of the words HE and SHE. The ſecond perſon is always ranked before the firſt, and the third before the ſecond. The perſonal pronouns have ſeven caſes, which are varied in a very irregular manner. Leaving theſe to the Bengalian grammar, we ſhall proceed to the *verb*.

The Sanſcrit, the Arabic, the Greek and Latin verbs, are furniſhed with a ſet of inflections and terminations ſo comprehenſive and ſo complete, that by their form alone they can expreſs all the different diſtinctions both of perſons and time. Three ſeparate qualities in them are perfectly blended and united. Thus by their root they denote a particular act, and by their inflection both point out the time when it takes place and the number of the agents. In Perſian, as in Engliſh, the verb admits but of two forms, one for the preſent tenſe and one for the aoriſt; and it is obſervable, that while the paſt tenſe is provided for by a peculiar inflection, the future is generally ſupplied by an additional verb conveying only the idea of time, without any other influence on the act implied by the principal verb. It is alſo frequently neceſſary that the different ſtate of the action, as perfect or imperfect, be further aſcertained in each of the tenſes, paſt, preſent, and future. This alſo, in the learned languages, is performed by other variations of inflections, for which other verbs and other particles are applied in the modern tongues of Europe and Perſia.

105 Middle voice of Sanſcrit verbs. Every Sanſcrit verb has a form equivalent to the middle voice of the Greek, uſed through all the tenſes with a reflective ſenſe, and the former is even the moſt extenſive of the two in its uſe and office: for in Greek the reflective can only be adopted intranſitively when the action of the verb deſcends to no extraneous ſubject; but in Sanſcrit, the verb is both reciprocal and tranſitive at the ſame time.

Neither the Sanſcrit, nor the Bengaleſe, nor the Hindoſtanic, have any word preciſely anſwering to the ſenſe of the verb *I have*, and conſequently the idea is always expreſſed by *eſt mihi*; and of courſe there is no auxiliary form in the Bengal verb correſpondent to *I have written*, but the ſenſe is conveyed by another mode. The verb ſubſtantive, in all languages, is defective and irregular, and therefore the Sanſcrit calls it a *ſemi-verb*. It is curious to obſerve that the preſent tenſe of this verb, both in Greek and Latin, and alſo in the Perſian, appears plainly to be derived from the Sanſcrit. In the Bengaleſe, this verb has but two diſtinctions of time, the preſent and the paſt; the terminations of the ſeveral perſons of which ſerve as a model for thoſe of the ſame tenſe in all other verbs reſpectively.

106 Characteriſtics of the Bengaleſe verbs. Verbs of the Bengal language may be divided into three claſſes, which are diſtinguiſhed by their penultimate letter. The ſimple and moſt common form has

[illegible]

an open conſonant immediately preceding the final letter of the infinitive. The ſecond is compoſed of thoſe words whoſe final letter is preceded by another vowel or open conſonant going before it. The third conſiſts entirely of cauſals derived from verbs of the firſt and ſecond conjugations. The reader will eaſily gueſs at the impoſſibility of proſecuting this ſubject to any greater length: we ſhall therefore conclude with a few remarks collected from the grammar ſo often mentioned, which we apprehend may be more amuſing, if not more intereſting.

The Greek verbs in *μι* are formed exactly upon the ſame principle with the Sanſcrit conjugations, even in the minuteſt particulars. Inſtances of this are produced in many verbs, which from a root form a new verb by adding the ſyllable *mi*, and doubling the firſt conſonant. This mode furniſhes another preſumption of the Egyptian origin of the Sanſcrit. Many Greeks travelled into Egypt; many Egyptian colonies ſettled in Greece. By one or other of thoſe channels the foregoing innovation might have been introduced into the Greek language.

To form the paſt tenſe, the Sanſcrit applies a ſyllabic augment, as is done in the Greek: the future has for its characteriſtic a letter analogous to that of the ſame tenſe in the Greek, and it omits the reduplication of the firſt conſonant. It may be added, that the reduplication of the firſt conſonant is not conſtantly applied to the preſent tenſe of the Sanſcrit more than to thoſe of the Greek.

The natural ſimplicity and elegance of many of the Aſiatic languages are greatly debaſed and corrupted by the continual abuſe of auxiliary verbs; and this inconvenience has evidently affected the Perſian, the Hindoſtan, and the Bengal idioms.

The infinitives of verbs in the Sanſcrit and Bengaleſe are always uſed as ſubſtantive nouns. Every body knows that the ſame mode of arrangement very often occurs in the Greek.

In the Sanſcrit language, as in the Greek, there are forms of infinitives and of participles comprehenſive of time; there are alſo other branches of the verb that ſeem to reſemble the gerunds and ſupines of the Latin.

All the terms which ſerve to qualify, to diſtinguiſh, or to augment, either *ſubſtance* or *action*, are claſſed by the Sanſcrit grammarians under one head; and the word uſed to expreſs it literally ſignifies *increaſe* or *addition*. According to their arrangement, a ſimple ſentence conſiſts of three members; the *agent*, the *action*, the *ſubject*: which, in a grammatical ſenſe, are reduced to two; the *noun* and the *verb*. They have a particular word to ſpecify ſuch words as amplify the noun which imports quality, and anſwers to our *adjectives* or *epithets*: Such as are applied to denote relation or connection, are intimated by another term which we may tranſlate *prepoſition*.

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Sanſcrit and Bengaleſe adjectives.

The adjectives in Bengaleſe have no diſtinction of gender or number; but in Sanſcrit theſe words preſerve the diſtinction of gender, as in the Greek and Latin.

Prepoſitions are ſubſtitutes for caſes, which could not have been extended to the number neceſſary for expreſſing all the ſeveral relations and predicaments in which a noun may be found, without cauſing too much embarraſſment in the form of a declenſion. Thoſe are too few in the Greek language, which occaſions much inconvenience. See ſect. *Greek*.

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The Latin is leſs poliſhed than the Greek, and of conſequence bears a much nearer reſemblance to the Sanſcrit, both in words, inflections, and terminations.

The learned are now convinced that the uſe of numerical figures was firſt derived from India. Indeed the antiquity of their application in that country far exceeds the powers of inveſtigation. All the numerals in Sanſcrit have different terms for the different genders, as in Arabic. There appears a ſtrong probability that the European method of computation was derived from India, as it is much the ſame with the Sanſcrit, though we think the Europeans learned it from the Arabians. The Bengaleſe merchants compute the largeſt ſums by *fours*; a cuſtom evidently derived from the original mode of computing by the fingers.

The Sanſcrit language, among other advantages, has a great variety in the mode of arrangement; and the words are ſo knit and compacted together, that every ſentence appears like one complete word. When two or more words come together *in regimine*, the laſt of them only has the termination of a caſe; the others are known by their poſition; and the whole ſentence ſo connected, forms but one compound word, which is called a *foot*.

SECT. VI. *Of the Chineſe Language.*

108
Antiquity of the Chineſe.

THE Chineſe, according to the moſt authentic accounts, are a people of great antiquity. Their ſituation was ſuch, as, in the earlieſt ages of the world, in a great meaſure ſecured them from hoſtile invaſion. Their little commerce with the reſt of mankind precluded them the knowledge of thoſe improvements which a mutual emulation had often generated among other nations, who were ſituated in ſuch a manner, with relation to each other, as ſerved to promote a mutual intercourſe and correſpondence. As China is a large and fertile country, producing all the neceſſaries, conveniencies, and even the luxuries of life, its inhabitants were not under the neceſſity of looking abroad for the two former, nor expoſed to the temptation of engaging in foreign commerce, in order to procure the latter. Perfectly ſatisfied with the articles which their own country produced, they applied themſelves entirely to the practice of agriculture and other arts connected with that profeſſion; and their frugality, which they retain even to this day, taught them the leſſon of being contented with little; of conſequence, though their population was almoſt incredible, the produce of their ſoil was abundantly ſufficient to yield them a ſubſiſtence. Their inventions were their own; and as they borrowed nothing from other people, they gradually began to deſpiſe the reſt of mankind, and, like the ancient Egyptians, branded them with the epithet of *barbarians*.

Thoſe people had at an early period made amazing proficiency in the mechanical arts. Their progreſs in the liberal ſciences, according to the lateſt and indeed the moſt probable accounts, was by no means proportioned. In mathematics, geometry, and aſtronomy, their knowledge was contemptible; and in ethics, or moral philoſophy, the complexion of their laws and cuſtoms

Chineſe Language.

[illegible] prove their ſkill to have been truly ſuperficial. They value themſelves very highly at preſent upon their oratorical talents; and yet of all languages ſpoken by any civilized people, theirs is confeſſedly the leaſt improved. To what this untowardly defect is owing, the learned have not yet been able to determine.

100 Their language an original tongue.

The language of the Chineſe is totally different from thoſe of all other nations, and bears very ſtrong marks of an original tongue. All its words are monoſyllabic, and compoſitions and derivations are altogether unknown. Their nouns and verbs admit of no inflexions; in ſhort, every thing relating to their idioms is peculiar, and incapable of being compared with any other dialect ſpoken by any civilized people. Moſt other languages have exhibited ſomething that reſembles an attempt towards [illegible] claſſical modifications of ſpeech; whereas the Chineſe, after a ſpace of 4000 years, have not advanced one ſtep beyond the very firſt elements of ideal communication. This circumſtance, we think, is a plain demonſtration that they did not emigrate from that region where the primitive race of mankind is thought to have fixed its reſidence. Some have imagined, we believe with good reaſon, that they are a *Tartarian* race, which, breaking off from the main body of that numerous and widely extended people, directed their march towards the ſouth-eaſt. There, falling in with delightful and fertile plains which their poſterity [illegible] inhabit, they found themſelves accommodated ſo much to their liking, that they dropped all deſire of changing their habitations. The country of China is, indeed, ſo environed with mountains, deſerts, and ſeas, that it would have been difficult for men in their primitive ſtate to have emigrated into any of the neighbouring regions. Thus ſecluded from the reſt of mankind, the Chineſe, in all probability, were left to the ſtrength of their own inventive powers to fabricate a language, as well as the other arts and improvements neceſſary for the ſupport and convenience of life.

It is indeed obvious that their ſtock of vocables, when they emigrated from Tartary, was neither ample nor properly accommodated to anſwer the purpoſes of the mutual conveyance of ideas. With this ſlender ſtock, however, they ſeem to have been ſatisfied; for it does not appear that any additions were afterwards made to that which was originally imported. Inſtead of forming a new race of terms by compounding their primitive ones; inſtead of diverſifying them by inflections, or multiplying them by derivatives, as is done in every other language; they rather choſe to retain their primitive words, and by a variety of modifications, introduced upon their orthography or pronunciation, to accommodate them to a variety of ſignifications. Were is poſſible to ſcrutinize all the Tartarian dialects, and to reduce them to their primitive monoſyllabic character, perhaps the original language of the Chineſe might be inveſtigated and aſcertained. We know that attempts have been made to compare it with ſome of the other Aſiatic languages, eſpecially the *Hebrew*. This labour has, however, proved unſucceſsful, and no primeval identity has been diſcovered. Before this compariſon could be inſtituted with the moſt diſtant proſpect of ſucceſs, the language laſt mentioned muſt be ſtripped of all its adventitious qualities; and not only ſo, but it muſt be reduced to the monoſyllabic tone, and then compared with the Chineſe monoſyllables; an undertaking which we are perſuaded would not be readily executed. After all, we are convinced that no reſemblance of any importance would be diſcovered.

110 [illegible] its fabrication.

The Chineſe language muſt then, in our opinion, have been a Tartarian dialect, as the people themſelves were coloniſts from Tartary. We have obſerved above, that thoſe people have not hitherto found out the art of compoſition of words. This is the more ſurpriſing, when we conſider that, in the characters which form their written language, they employ many compoſitions. For example, the character by which they repreſent *misfortune*, is compoſed of one hieroglyphic which repreſents a *houſe*, and another which denotes *fire*; becauſe the greateſt misfortune that can befal a man is to have his houſe on fire. With reſpect to the language which they uſe in ſpeech, though they very often employ many words to expreſs one thing, yet they never run them together into one word, making certain changes upon them that they may incorporate the more conveniently, but always preſerve them entire and unaltered.

111 [illegible]

The whole number of words in the Chineſe language [illegible] does not exceed 1200: the roots are but 3[illegible]. It muſt certainly appear ſurpriſing, that a people whoſe manners are ſo highly poliſhed and refined, ſhould be able to expreſs ſo many things as muſt of neceſſity attend ſuch a courſe of life by ſo ſmall a number of words, and thoſe too monoſyllables. The difficulties which attend this ſingular mode muſt be felt almoſt every inſtant; circumſtances which, according to the ordinary courſe of things, ſhould have induced them to attempt both an augmentation of the number of their words and an extenſion of thoſe which they had by compoſition and derivation. We learn from Du Halde * that the Chineſe have two different dialects; the one vulgar, which is ſpoken by the vulgar, and varies according to the different provinces; the other is called the *Mandarin language*, and is current only among the learned. The latter is properly that which was formerly ſpoken at court in the province of *Kiang-nan*, and gradually ſpread among the polite people in the other provinces. Accordingly, this language is ſpoken with more elegance in the provinces adjoining to *Kiang-nan* than in any other part of the kingdom. By ſlow degrees it was introduced into all parts of the empire, and conſequently became the univerſal language.

It then appears that the modern language of China was originally the court dialect, and utterly unknown to the bulk of the people. From this circumſtance we think it may fairly be concluded that this dialect was deemed the royal tongue, and had been fabricated on purpoſe to diſtinguiſh it from the vulgar dialects. We learn from Heliodorus, that the † Ethiopians had a royal language which was the ſame with the ſacred idiom of the Egyptians. This Mandarin tongue was originally an artificial dialect fabricated with a view to enhance the majeſty of the court, and to raiſe its very ſtyle and diction above that of the reſt of mankind. The Chineſe, a wonderfully inventive people, might actually contrive a language of that complexion, with an intention to render it obſcure and

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* [illegible] *China*, vol. ii.

† [illegible] lib. vi.

and enigmatical (N). Such a plan would excite their admiration, and would at the ſame time greatly exceed their comprehenſion. In proceſs of time, when the Chineſe empire was extended, the Mandarins who had been been brought up at court, and underſtood nothing of the provincial dialects, found it convenient to have the moſt eminent perſons in every province taught the language employed by themſelves in order to qualify them for tranſacting the affairs of government with them in a language which both underſtood. By this means the royal dialect deſcended to the vulgar, and in proceſs of time became univerſal. The Tartar dialect formerly in uſe vaniſhed; only a few veſtiges of it remained; which gradually incorporating with the royal language, occaſioned the variation of provincial tongues above mentioned.

We are therefore clearly of opinion, that the modern language of the Chineſe was deduced from the original Mandarin, or court dialect, and that this laſt was an artificial ſpeech fabricated by the ſkill and ingenuity of that wonderful people. The learned have long held it up as the primary dialect, becauſe, ſay they, it bears all the ſignatures of an original unimproved language. In our opinion, nothing appears more ingeniouſly artificial. It is univerſally allowed that, in its ſtructure, arrangement, idioms, and phraſeology, it reſembles no other language. Is not every learned man now convinced that all the Aſiatic languages yet known, diſcover unequivocal ſymptoms of their cognation and family reſemblance? The Ethiopians, Chaldeans, Arabians, Perſians, Egyptians, Hebrews, Phœnicians, the Brahmans, Bengaleſe, the Hindoos bordering upon China, all ſpeak only different dialects of one language, varying from the original in dialect only, ſome in a greater ſome in a leſſer degree: why ſhould the Chineſe alone ſtand altogether inſulated and unallied?

The languages of the North all wear congenial features. The Tartar or Tatar dialects of every clan, of every canton, of every denomination, exhibit the moſt palpable proofs of a near affinity: the Gothic and Sclavonian dialects, which pervade a great part of Europe and ſome parts of Aſia, are obviouſly brethren, and may eaſily be traced up to an Aſiatic original. Even ſome of the American jargon dialects contain vocables which indicate an Aſiatic or European original. Our readers, we flatter ourſelves, will agree with us, that had the language of the Chineſe been the original language, a reſemblance muſt have ſtill exiſted between it and its deſcendants. If it had originated from any other language, it would have retained ſome characteriſtic features of its parent archetype. As neither of theſe is to be found in the fabric of the language under conſideration, the concluſion muſt be, that it is a language entirely different from all other tongues; that it is conſtructed upon different principles, deſcended from different parents, and framed by different artiſts.

The Chineſe themſelves have a common and immemorial tradition, that their language was framed by *Yao* their firſt emperor, to whom they attribute the invention of every thing curious, uſeful, and ornamental. Traditional hiſtory, when it is ancient, uniform, and univerſal, is generally well founded: upon this occaſion we think the tradition above mentioned may be fairly admitted as a collateral evidence.

112
A proof of its artificial ſtructure.

The paucity of vocables contained in this ſingular language, we think another preſumption of its artificial contexture. The Chineſe *Onomathetæ* would find it an arduous taſk to deviſe a great number of new terms, and would therefore reſt ſatisfied with the ſmalleſt number poſſible. In other languages we find the like economy was obſerved. Rather than fabricate new words, men choſe ſometimes to adapt old words to new, and, upon ſome occaſions, even to contrary ſignifications. To ſpare themſelves the trouble of coining new terms, they contrived to join ſeveral old ones into one; whence aroſe a numerous race of compounds. Derivatives too were fabricated to anſwer the ſame purpoſe. By this proceſs, inſtead of creating new vocables, old ones were compounded, diverſified, deflected, ramified, metamorphoſed, and tortured into a thouſand different ſhapes.

The Greek is deſervedly eſteemed a rich and copious language; its radical words have been curiouſly traced by ſeveral learned men, who, after the moſt laborious and exact ſcrutiny, have found that they do not amount to more than 300. The Sanſcrit language is highly compounded; its radical terms, however, are very few in number. Upon the whole, we think we may conclude, that the more any language abounds in compounds and derivatives, the ſmaller will be the number of its radical terms. The Arabic admits of no compoſition, and of conſequence its words have been multiplied almoſt *in infinitum;* the Sanſcrit, the Perſian, and the Greek, abound with compounds, and we find their radicals are few in proportion.

113
Three different methods of enriching a language.

There are, we think, three different methods which may be employed in order to enrich and extend the range of a language. 1ſt, By fabricating a multitude of words; the plan which has been purſued by the Arabs. 2d, By framing a multitude of compounds and derivatives; the artifice employed by the Greeks and the authors of the Sanſcrit. 3d, By varying the ſignification of words without enlarging their number; the method practiſed by the Chineſe and their coloniſts. The Arabians, we think, have ſhown the moſt fertile and inventive genius, ſince they have enriched their language by actually creating a new and a moſt numerous race of words. The fabricators of the Sanſcrit and the collectors of the Greek have exhibited art, but *comparatively* little fertility of genius. Leaving, therefore, the Arabians, as in juſtice we ought, maſters of the field in the conteſt relating to the formation of language, we may range the Greek and Sanſcrit on the one ſide, and the Chineſe on the other; and having made this arrangement, we may attempt to diſcover on which ſide the largeſt proportion of genius and invention ſeems to reſt.

(N) An attempt of this nature, among a people like the Chineſe, is by no means improbable; nor is its ſucceſs leſs probable. For a proof of this, we need only have recourſe to Biſhop Wilkins's Artificial Language, and Pſalmanazar's Dictionary of the language of Formoſa.

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The Greek and Sanſcrit (for we have ſelected them as moſt highly compounded) exhibit a great deal of art in inventing, arranging, and diverſifying their compounds and derivatives, in ſuch a manner as to qualify them for intimating complex ideas; but the Chineſe have performed the ſame office by the help of a race of monoſyllabic notes, ſimple, intelligible, invariable, and at the ſame time few in number. The queſtion then comes to be, whether more art is diſplayed in new-modelling old words by means of declenſions, compounds, and derivatives; or by deviſing a plan according to which monoſyllabic radical terms, abſolutely invariable, ſhould, by a particular modification of ſound, anſwer all the purpoſes performed by the other. The latter appears to us much more ingeniouſly artificial. The former reſembles a complicated machine compoſed of a vaſt number of parts, congenial indeed, but looſely connected; the latter may be compared to a ſimple, uniform engine, eaſily managed, and all its parts properly adjuſted. Let us now ſee in what manner the people in queſtion managed their monoſyllabic notes, ſo as to qualify them for anſwering all the purpoſes of ſpeech.

114
That adopted by the Chineſe.

Though the number of words in the Chineſe language does not amount to above 1200; yet that ſmall number of vocables, by their artificial management, is ſufficient to enable them to expreſs themſelves with eaſe and perſpicuity upon every ſubject. Without multiplying words, the ſenſe is varied almoſt *in infinitum* by the variety of the accents, inflections, tones, aſpirations, and other changes of the voice and enunciation; circumſtances which make thoſe who do not thoroughly underſtand the language frequently miſtake one word for another. This will appear obvious by an example.

The word *teov* pronounced ſlowly, drawing out the *v* and raiſing the voice, ſignifies a *lord* or *maſter*. If it is pronounced with an even tone, lengthening the *v*, it ſignifies a *hog*. When it is pronounced quick and lightly, it imports a *kitchen*. If it be pronounced in a ſtrong and maſculine tone, growing weaker towards the end, it ſignifies a *column*.

By the ſame economy, the ſyllable *po*, according to the various accents, and the different modes of pronunciation, has eleven different ſignifications. It ſignifies *glaſs*, *to boil*, *to winnow rice*, *wiſe or liberal*, *to prepare*, *an old woman*, *to break or cleave*, *inclined*, *a very little*, *to water*, *a ſlave or captive*. From theſe examples, and from almoſt numberleſs others which might be adduced, it is abundantly evident that this language, which at firſt ſight appears ſo poor and confined, in conſequence of the ſmall number of the monoſyllables of which it is compoſed, is notwithſtanding very copious, rich, and expreſſive.

Again, the ſame word joined to various others, imports a great many different things: for example *mou*, when alone, ſignifies a *tree*, *wood;* but when joined with another word, it has many other ſignifications. *Mou leoo*, imports "wood prepared for building;" *mou kan*, is "bars, or wooden grates;" *mou hia*, "a box;" *mou ſang*, "a cheſt of drawers;" *mou tſiang*, "a carpenter;" *mou eul*, "a muſhroom;" *mou nu*, "a ſort of ſmall orange;" *mou ſing*, "the planet Jupiter;" *mou mien*, "cotton," &c. This word may be joined to ſeveral others, and has as many different ſignifications as it has different combinations.

Thus the Chineſe, by a different arrangement of their monoſyllables, can compoſe a regular and elegant diſcourſe, and communicate their ideas with energy and preciſion; nay even with gracefulneſs and propriety. In theſe qualities they are not excelled either by the Europeans or Africans, who uſe alphabetical letters. In fine, the Chineſe ſo naturally diſtinguiſh the tones of the ſame monoſyllable, that they comprehend the ſenſe of it, without making the leaſt reflection on the various accents by which it is determined.

115
Conſequences of this method of pronunciation.

We muſt not, however, imagine, as ſome authors have related, that theſe people ſing in ſpeaking, and make a ſort of muſic which is very diſagreeable to the ear; theſe different tones are pronounced ſo curiouſly, that even ſtrangers find it difficult to perceive their difference even in the province of *Kiang-nan*, where the accent is more perfect than in any other. The nature of it may be conceived by the guttural pronunciation in the Spaniſh language, and by the different tones that are uſed in the French and Italian: theſe tones are almoſt imperceptible; they have, however, different meanings, a circumſtance which gave riſe to the proverb, that *the tone is all*.

If the fineneſs and delicacy of their tones are ſuch as to be ſcarce perceptible to a ſtranger, we muſt ſuppoſe that they do not riſe high, but only by ſmall intervals; ſo that the muſic of their language muſt ſomewhat reſemble the muſic of the birds, which is within a ſmall compaſs, but nevertheleſs of great variety of notes. Hence it will follow, that ſtrangers will find it very difficult, if not impoſſible, to learn this language; more eſpecially if they have not a delicate ear and a flexible voice, and alſo much practice. The great difference then between the Chineſe and Greek accents conſiſts in this, that the Greeks had but two accents, the grave and acute, diſtinguiſhed by a large interval, and that not very exactly marked: for the acute, though it never riſes above a fifth higher than the grave, did not always riſe ſo high, but was ſometimes pitched lower according to the voice of the ſpeaker. The Chineſe muſt have many more accents, and the intervals between them muſt be much ſmaller, and much more carefully marked; for otherwiſe it would be impoſſible to diſtinguiſh them. At the ſame time, their language muſt be much more muſical than the Greek, and perhaps more ſo than any language ought to be; but this becomes neceſſary for the purpoſes above-mentioned. Du Halde is poſitive, that notwithſtanding the perpetual variation of accents in the Chineſe tongue, and the almoſt imperceptible intervals between theſe tones, their enunciation does not reſemble ſinging: many people, however, who have reſided in China, are equally poſitive that the tone with which they utter their words does actually reſemble *canting;* and this, when we conſider the almoſt imperceptible intervals by which they are perpetually raiſing and lowering the tone of their voice, appears to us highly probable.

As the people of whoſe language we are treating at preſent communicate a variety of different ſignifications to their monoſyllabic words by their different accentuation, ſo they employ quantity for the very ſame purpoſe. By lengthening or ſhortening the vowels of their words, they employ them to ſignify very different things. The ſame they perform by giving their words different aſpiaccents, as likewiſe by ſounding them with different degrees of roughneſs and ſmoothneſs; and even ſometimes by the different motion, poſture, or attitude, with which their enunciation is accompanied. By theſe methods of diverſifying their monoſyllables (ſays Du Halde), they make 330 of them ſerve all the purpoſes of language, and theſe too not much varied in their termination; ſince all the words in that language either terminate with a vowel or with the conſonant *n*, ſometimes with the conſonant *g* annexed.

From this account, we think it is evident that the Chineſe, by a wonderful exertion of ingenuity, do, by different tones and proſodical modifications, by means of a very inconſiderable number of words, all invariable radicals, actually perform all that the moſt poliſhed nations have been able to atchieve by their compounds, derivatives, &c. diverſified by declenſions, conjugations, and flexions of every kind; circumſtances which, in our opinion, reflect the greateſt honour on their inventive powers.

116
Grammar of the Chineſe.

With reſpect to the grammar of this language, as it admits of no flexions, all their words being indeclinable, their caſes and tenſes are all formed by particles. They have no idea of genders; and even the diſtinction of numbers, which in almoſt all other languages, even the moſt unimproved, is marked by a particular word, is in the Chineſe only indicated by a particle. They have only the three ſimple tenſes, namely, the paſt, preſent, and future; and for want of different terminations, the ſame word ſtands either for the verb or the verbal ſubſtantive, the adjective or the ſubſtantive derived from it, according to its poſition in the ſentence.

The Chineſe language being compoſed of monoſyllables, and theſe indeclinable, can ſcarce be reduced to grammatical rules: we ſhall, however, attempt to lay before our readers as much of the texture of that ſingular dialect as may enable them to form ſome vague idea of its genius and conſtitution. We ſhall begin with the letters, and proceed regularly to the remaining parts as they naturally ſucceed each other.

117
Chineſe letters or characters

The art of joining the Chineſe monoſyllables together is extremely difficult, and requires a very long and laborious courſe of ſtudy. As they have only figures by which they can expreſs their thoughts, and have no accents in writing to vary the pronunciation, they are obliged to employ as many different figures or characters as there are different tones, which give ſo many different ſignifications to the ſame word. Beſides, ſome ſingle characters ſignify two or three words, and ſometimes even a whole period. For example, to write theſe words, *good morrow, Sir*, inſtead of joining the characters which ſignify *good* and *morrow* with that of *Sir*, a different character muſt be uſed, and this character alone expreſſes theſe three words. This circumſtance greatly contributes to multiply the Chineſe characters.

This method of joining the monoſyllables is indeed ſufficient for writing ſo as to be underſtood; but it is deemed trifling, and is uſed only by the vulgar. The ſtyle that is employed, in order to ſhine in compoſition, is quite different from that which is uſed in converſation, though the words are in reality the ſame. In writings of that ſpecies, a man of letters muſt uſe more elegant phraſes, more lofty expreſſions, and the whole muſt be dignified with tropes and figures which are not in general uſe, but in a peculiar manner adapted to the nature of the ſubject in queſtion. The characters of Cochin-china, of Tonking, of Japan, are the ſame with thoſe of the Chineſe, and ſignify the ſame things; though, in ſpeaking, theſe nations do not expreſs themſelves in the ſame manner: of conſequence the language of converſation is very different, and they are not able to underſtand each other: while, at the ſame time, they underſtand each other's written language, and uſe all their books in common.

The learned muſt not only be acquainted with the characters that are employed in the common affairs of life, but muſt alſo underſtand their various combinations, and the numerous and multiform diſpoſitions and arrangements which of ſeveral ſimple ſtrokes make the compound characters. The number of their characters amounts to 80,000; and the man who knows the greateſt number of them is of courſe the moſt learned. From this circumſtance we may conclude, that many years muſt be employed to acquire the knowledge of ſuch a prodigious number of characters, to diſtinguiſh them when they are compounded, and to remember their ſhape and import. After all, a perſon who underſtands 10,000 characters may expreſs himſelf with tolerable propriety in this language, and may be able to read and underſtand a great number of books. The generality of their learned men do not underſtand above 15,000 or 20,000, and few of their doctors have attained to the knowledge of above 40,000. This prodigious number of characters is collected in their great vocabulary called *Hai-pien*. They have radical letters, which ſhow the origin of words, and enable them to find out thoſe which are derived from them: for inſtance, the characters of mountains, of trees, man, the earth, of a horſe, under which muſt be ſought all that belongs to mountains, trees, man, &c. In this ſearch one muſt learn to diſtinguiſh in every word thoſe ſtrokes or figures which are above, beneath, on the ſides, or in the body of the radical figure.

118
exceedingly numerous,

Clemens Alexandrinus (ſee Section *Chaldean*, &c.) informs us, that the Egyptians employed three ſorts of characters: The firſt was called the *epiſtolary*, which was uſed in writing letters; the ſecond was denominated *ſacred*, and peculiar to the ſacerdotal order; the laſt *hieroglyphical*, which was appropriated to monumental inſcriptions and other public memorials. This mode of repreſentation was twofold: one, and the moſt ſimple, was performed by deſcribing the picture of the object which they intended to repreſent, or at leaſt one that reſembled it pretty nearly; as when they exhibited the ſun by a circle and the moon by a creſcent: the other was properly ſymbolic; as when they marked *eternity* by a ſerpent with his tail in his mouth, the *air* by a man clothed in an azure robe ſtudded with ſtars, &c.

The Chineſe, in all probability, had the ſame variety of characters. In the beginning of their monarchy, they communicated their ideas by drawing on paper the images of the objects they intended to expreſs; that is, they drew the figure of a bird, a mountain, a tree, waving lines, to indicate birds, mountains, foreſts, rivers, &c.

There were, however, an infinite number of ideas to be communicated, whoſe objects do not fall under the cognizance of the ſenſes; ſuch as the ſoul, the thoughts, the

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the paſſions, beauty, deformity, virtues, vices, the actions of men and other animals, &c. This inconvenience obliged them to alter their original mode of writing, which was too confined to anſwer the purpoſe, and to introduce characters of a more ſimple nature, and to invent others to expreſs thoſe things which are the objects of our ſenſes.

119 And truly hieroglyphical.

Theſe modern characters are, however, truly hieroglyphical, ſince they are compoſed of ſimple letters which retain the ſignification of the primitive characters. The original character for the ſun was a circle, thus ☉; this they called *ge*: They now repreſent that luminary by the figure 日, to which they ſtill give the original name. But human inſtitutions having annexed to theſe laſt framed characters the very ſame ideas indicated by the original ones, the conſequence is, that every Chineſe letter is actually ſignificant, and that it ſtill retains its ſignificancy, though connected with others. Accordingly the word *tsai*, which imports "misfortune, calamity," is compoſed of the letter *mien* "a houſe," and the letter *ho* "fire;" ſo that the ſymbolical character for misfortune is the figure of a houſe on fire. The Chineſe characters, then, are not ſimple letters without any ſignification, like thoſe of the Europeans and other Aſiatics; but when they are joined together, they are ſo many hieroglyphics, which form images and expreſs thoughts.

Upon the whole, the original characters of the Chineſe were real pictures (ſee Section of the *Egyptian* language): the next improvement was the ſymbolical character; the third and laſt ſtage is the preſent mode, in which artificial ſigns have been fabricated, in order to repreſent ſuch thoughts or ideas as could not be repreſented by one or other of the methods above deſcribed. Du Halde, vol. ii. p. 400, *et ſeq.* has furniſhed us with rules for pronouncing the Chineſe vowels and conſonants; a piece of information which, we apprehend, would be of little conſequence to our readers, and which we ſhall therefore paſs over, and proceed to give a brief account of their grammar. As the whole language is compoſed of monoſyllables, and theſe indeclinable, its grammatical ſtructure muſt be ſimple and obvious: we ſhall only mention what to us appears ſingular and important.

120 Peculiarities of the Chineſe parts of ſpeech.

In the Chineſe language there is no diverſity of genders or caſes, and of conſequence no declenſions. Very often the noun is not diſtinguiſhed from the verb; and the ſame word which in one ſituation is a ſubſtantive, in another may become an adjective, and even a verb.

The adjective always goes before the ſubſtantive: but if it follow it, it becomes a ſubſtantive.

The caſes and numbers are known only by the compoſition. The plural number is diſtinguiſhed by the particle *men*, which is common to all nouns; but when the noun is preceded by ſome word that ſignifies number, the particle *men* is not annexed.

The Chineſe genitive, both ſingular and plural, when it comes after nouns, is often made by *ti*; and there is no other caſe in that language. The ſame particle is ſometimes placed after pronouns, as if they were derivatives.

The comparative degree is formed by adding the particle *keng*, which is always ſet before the noun, and ſignifies *much*. The particle *to* is ſometimes uſed, which likewiſe imports *much*.

Chineſe language.

The Chineſe have only three perſonal pronouns, *ngo* "I," *ni* "thou," and *ta* "he;" theſe become plural by adding the ſyllable *men*. They are made poſſeſſive by adding the ſyllable *ti*, as *ngo ti* "mine," *ni ti* "thine," *ta ti* "his." The patronymics are formed by putting the name of the city, country, &c. after the pronoun: *chon* is the pronoun relative *who*, *what*, *which*.

Chineſe verbs have only three tenſes, the preterperfect, the preſent, and the future. When there is no particle added to the verb, it is the preſent: the preterperfect is made by adding the particle *leao*: to diſtinguiſh the future tenſe they uſe the particle *tſiang* or *hoei*; and theſe are all the varieties incident to their verbs.

The Chineſe language has no words that are properly adverbs; they only become ſo by cuſtom, or by the place they poſſeſs in diſcourſe. They are often obliged to employ ſeveral words to expreſs the adverbs of other languages: they have none that are demonſtrative, or proper for calling or exhorting; but in their ſtead they are obliged to uſe nouns and verbs.

Perhaps our readers may wiſh to know the Chineſe numerals; and may imagine that they bear a reſemblance to thoſe of the European or other Aſiatic dialects. In this, however, they will be diſappointed.

They ſtand as follows:

Y	One
Eul	Two
San	Three
Sse	Four
Ou	Five
Lou	Six
Tſi	Seven
Pa	Eight
Kieou	Nine
Che	Ten
Che y	Eleven
Eul che	Twelve
San che	Thirteen
Pe	One hundred
Eul pe	Two hundred
Y tſien	One thouſand
Y ouan	Ten thouſand
Che ouan	Twenty thouſand
Eul ouan	One hundred thouſand
Che ouan	Two hundred thouſand
Y pe ouan	One million.

There are a great many particles proper to numbers in the Chineſe language: they are frequently uſed, and in a way peculiar to it; for every numeral has a particle importing the object to which it is attached. Thus *co* is uſed for man, and *ouei* for a woman, &c.; *ouei* is uſed for illuſtrious men; *tche* or *tchi* is uſed for ſhips, dogs, hens; *tcuy* is uſed for pearls and precious things; *pen* is uſed for books; *teou* is appropriated to oxen and cows; *fong* is uſed for letters and little bundles of papers; *ko* is employed for corn and paſte. Theſe diſtinctions indicate a language manufactured on purpoſe to be employed by people who were too high and too haughty to converſe with the vulgar.

122
Style of the Chineſe writers.

The ſtyle of the Chineſe, in their elaborate compoſitions, is myſterious, conciſe, and allegorical, after the eaſtern manner. It is often obſcure to thoſe who do not underſtand the language thoroughly; and it requires a conſiderable degree of ſkill to avoid miſtakes in reading an author of elegance and ſublimity. Their writers expreſs a great deal in few words; and their expreſſions are lively, full of ſpirit, intermingled with bold compariſons and lofty metaphors. They affect to inſert in their compoſitions many ſentences borrowed from their five canonical books; and as they compare their books to pictures, ſo they liken theſe quotations to the five principal colours employed in painting; and in this their eloquence chiefly conſiſts.

They prefer a beautiful character to the moſt finiſhed picture; and nothing is more common than to ſee a ſingle page covered with old characters, if they happen to be fair and elegant, ſold at a very high price. They honour their characters in the moſt common books; and when they happen to light by chance upon a printed leaf, they gather it up with the greateſt care and reſpect.

In China there are three varieties of language; that of the common people, that of the people of faſhion, and that employed in writing books. Though the firſt is not ſo elegant as either of the other two, it is not however inferior to our European languages; though thoſe who are but ſuperficially acquainted with the Chineſe may, in fact, imagine it uncouth and barbarous. This low and rude language is pronounced and written many different ways, as is generally the caſe in other countries.

But a more poliſhed, and at the ſame time a much more energetic, language, is employed in an almoſt infinite number of novels; ſome perhaps true, but many more the vehicles of fiction. Theſe are replete with lively deſcriptions, characters highly finiſhed, morality, variety, wit, and vivacity, in ſuch a degree as to equal in purity and politeneſs the moſt celebrated authors of Europe. This was the language of the Mandarins; and though exquiſitely beautiful in its kind, was ſtill inferior to the language of books. This laſt might be ſtyled the *hyperſublime*; and of this there are ſeveral degrees and intervals before an author can arrive at what they call the language of the *king*. This mode of writing cannot be well underſtood without looking upon the letters; but when underſtood, it appears eaſy and flowing. Each thought is generally expreſſed in four or ſix characters: nothing occurs that can offend the niceſt ear; and the variety of the accents with which it is pronounced produces a ſoft and harmonious ſound.

The difference between the *king* and their other books conſiſts in the difference of the ſubjects upon which they are written. Thoſe of the former are always grand and ſublime, and of courſe the ſtyle is noble and elevated: thoſe of the latter approach nearer to the common affairs and events of life, and are of conſequence detailed in the Mandarin tongue. In writing on ſublime ſubjects no punctuations are uſed. As theſe compoſitions are intended for the learned only, the author leaves to the reader to determine where the ſenſe is complete; and thoſe who are well ſkilled in the language readily find it out.

The copiouſneſs of the Chineſe language is in a great meaſure owing to the multitude of its characters. It is likewiſe occaſioned, in ſome degree, by the difference of their ſignification, as alſo by the artificial method of their conjunction, which is performed moſt commonly by uniting them two and two, frequently three and three, and ſometimes four and four.

123
Their books numerous and bulky.

Their books are very numerous and bulky, and of courſe exceedingly cumbrous. A dictionary of their language was compiled in the 18th century. It conſiſted of 95 large volumes. An appendix was annexed of 25 volumes. Their other books are voluminous in proportion. The Chineſe, one may ſay, are a nation of learned men. Few people of rank neglect the belles lettres; for ignorance in a man of any degree of eminence is deemed an indelible ſtain on his character.

For their manner of writing, the implements with which they write, and the materials upon which they draw their characters, we muſt refer our readers to the article WRITING. It would, we believe, afford our readers ſome pleaſure, could we diſcover and explain the reaſons which have hitherto prevented the Chineſe from adopting the letters employed from time immemorial by the other nations of Europe and Aſia.

124
Obſtacles to their improvement in ſcience and literature.

The Chineſe have ever looked upon themſelves as greatly ſuperior to the reſt of mankind. In ancient times they entertained ſuch contemptible notions of foreigners, that they ſcorned to have any further commerce with them than to receive their homage. They were indeed, at a very early period, highly revered by the Indians, Perſians, and Tartars. In conſequence of this veneration, they looked upon themſelves as the favourites of heaven. They imagined they were ſituated in the middle of the earth, in a kind of paradiſe, in order to give laws to the reſt of mankind. Other men they looked upon with contempt and diſdain, and deemed them deformed in body and defective in mind, caſt out into the remote corners of the world as the droſs and refuſe of nature. They boaſted that themſelves only had received from God rational ſouls and beautiful bodies, in order to qualify them for being ſovereigns of the ſpecies.

Such are the ſentiments of the Chineſe; and with ſuch ſentiments it is by no means ſurpriſing that their improvements in *language*, in *writing*, and other appendages of the belles lettres, have not been proportioned to their progreſs in mechanics. When people are once fully perſuaded that they have already arrived at the ſummit of perfection, it is natural for them to ſit down contented, and ſolace themſelves with the idea of their own ſuperior attainments. The Chineſe had early entertained an exalted opinion of their own ſuperiority to the reſt of mankind; and therefore imagined that they had already carried their inventions to the *ne plus ultra* of perfection; the conſequence was, that they could make no exertions to carry them higher.

The Chineſe, for the ſpace of 3000 years, had almoſt no intercourſe with the reſt of mankind. This was the conſequence of their inſulated ſituation.—They, of courſe, *compared themſelves with themſelves*; and finding that they excelled all their barbarian neighbours,

Chineſe language.

been, they readily entertained an opinion that they exceeded all the reſt of mankind in an equal proportion. This conceit at once ſtifled the emotions of ambition, and deprived them of all opportunities of learning what was going forward in other parts of the world.

They deſpiſed every other nation. People are little diſpoſed to imitate thoſe whom they deſpiſe; and this perhaps may be one reaſon why they are at this day ſo averſe from adopting the European inventions.

A ſuperſtitious attachment to the cuſtoms of the ancients, is the general character of the Aſiatic nations. This is evidently a kind of diacritical feature among the Chineſe. The inſtitutions of *Fohi* are looked up to among them with equal veneration as thoſe of *Thoth* were among the Egyptians. Among the latter, there was a law which made it capital to introduce any innovation into the muſic, painting, or ſtatuary art, inſtituted by that legiſlator. We hear of no ſuch law among the former; but cuſtom eſtabliſhed, and that inviolably, for a ſpace of 3000 years, might operate as forcibly among them as a poſitive law did among the people firſt mentioned. An attachment to ancient cuſtoms is often more powerful and more coercive than any law that can be promulgated and enforced by mere human authority. Theſe reaſons, we think, may be alleged as the impediments to the progreſs of the Chineſe in the belles lettres, and perhaps in the cultivation of the other ſciences.

125 Chineſe words found in various other languages.

Though the language of the Chineſe is confeſſedly different from all the other known languages in its character and conſtruction, it contains, however, a great number of words evidently of the ſame origin with thoſe which occur in other dialects, uſed by people, who, according to the natural courſe of things, could never have been connected with that remote country. A few of thoſe we ſhall produce before we conclude this ſection. We ſhall begin with the import of the name *China*.

China, or, as the orientals write it, *Sin*, is perhaps the Latin *ſinus*, "the boſom, the heart, the middle." The Chineſe actually imagine that their country is ſituated in the very middle of the earth, and of conſequence call it *Cham*, "the middle, the heart;" a denomination which exactly ſuits their opinion.

Tu, in Chineſe, intimates every thing that falls under the cognizance of the ſenſes, every thing that ſtrikes the ſight; in Latin, *tueor*.

Ta, a table, a plank, a figure that renders every thing ſenſible: 2. To ſee, to look upon, to appear; Greek ταν τανυω, whence τεινω, *tendo*.

Tue, to examine attentively, to inſpect carefully.

Tui, the moſt apparent, chief, principal, firſt; 2. Lightning, thunder.

Teu, a ſign by which to know one, letter of acknowledgment. All theſe ideas are contained in the Hebrew תו, *thu*, *ſignum*, which we believe has produced the Egyptian *theuth*, the god or godlike man who invented letters, geometry, muſic, aſtronomy, &c.

Tai, a dye, a theatre; Greek of old Θεαω, then Θεαομαι, "to ſee, to look."

Tam, Latin *tantum*, "ſo much."

Tan, land, country, region, a ſyllable annexed to the end of a great number of words. *Agua-tan*, *Agua-ſtan*, "a land of water;" *Maur-tan*, *Mauritania*, "the land of the Moors." The orientals prefix *s*, whence *Farſi ſtan*, *Farſiſtan*, "the land or country of the Perſians;" *Chuſi ſtan*, *Chuſiſtan*, "the country of Chuz;" *Turque ſtan*, *Turqueſtan*, "the land of the Turks."

Ti, a chief, an emperor, a title of dignity; whence the Greek τιω "to honour;" hence, too, the word *di* "bright, glorious;" whence Δις "Jupiter," Διος "divine;" the Latin *Dius*, now *Deus*, "God," and *Divus*, with the *digamma Æolicum* inſerted; the Celtic *Dhia*, &c. It ſignified originally "bright, glorious," and was an epithet of the Sun.

Tam, Latin *tumeo*, "to ſwell."

Liven, "to love;" Hebrew לב, *lib*, "the heart;" Latin, *libet*. This word pervades all the dialects of the the Gothic tongue, ſtill retaining either the ſame or a nearly analogous ſignification.

Li, "letters;" Latin, *lino*, "to daub," as the Chineſe actually do in forming their letters.

Lo, "to contain, that which contains;" Celtic, *log*; French, *loge*, *logis*, *loger*.

Lim, "a rule;" hence Latin, *linea*, "a line."

Su, "with;" Greek, συν, "with;" Celtic, *cyn*, *cym*; whence Latin, *cum*, *con*, &c.

Xim, "very high, elevated, ſacred, perfect;" Latin, *eximius*.

Sin, "the heart;" Perſian, *Sin*, "the heart."

Sien, "chief, firſt;" Celtic, *can*, *cean*, *ſan*, "the head;" metaphorically, the chief, the firſt, the principal; Thibet, *len*, or *ken*, "great, elevated;" Arabic, *ſame*, "to be elevated or raiſed."

Sim, or *Sing*, "a conſtellation, a ſtar, an element;" Hebrew, *ſhem*: Greek, σημειον, σημα; Latin, *ſignum*.

Se, "a man of learning;" Goth. Sax. Engl. "ſee; to ſee, ſeer."

Can, "a prieſt;" Hebr. *cohen*; Syr. *con*; Egypt. *con*, *cun*.

Quen, "a king; Celtic, *ken*, *kend*, "head, chief;" Gothic, *kaning*; Germ. Flem. Eng. *king*, alſo *queen*.

Hu, "a door; Goth. Germ. Engl. *hus*, *hauſen*, *houſe*.

Man, "a river;" Welch, *men*, "the water of a river;" Latin, *mano*, "to flow," and perhaps *amœnus*, "pleaſant."

Hen, "hatred;" Greek, αινος, "cruel, horrible, odious."

Kuen, "a dog;" Greek κυων, *id.*

Ven, "beauty;" Latin, *Venus*, *venuſtas*; Iceland. Swed. *wen*, "pleaſant;" Scotch, *winſome*.

Han, "the ſoul, breath;" Greek, ανεμος; Latin, *anima*, *animus*.

To theſe inſtances of the analogy between the Chineſe language and thoſe of the other people of Aſia and Europe many more might be added; but the preceding, it is hoped, will ſerve as a ſpecimen, which is all that can be expected from an inquiry of the nature of the preſent.

Sect. VII. *Of the Greek Language.*

Before we enter upon the conſideration of the elemental and conſtituent parts of the Greek language, we muſt beg leave to hint a few preliminaries, which, we that will help to throw ſome light upon many points which may come under conſideration in the courſe of the following diſquiſition.

The Greeks, according to the moſt authentic accounts, were deſcended of Javan or Ion, the fourth ſon of Japhet, the eldeſt ſon of the patriarch Noah. The Scriptures of old, and all the orientals to this day, call the Greeks *Ionim*, or *Jaunam*, or *Javenoth*. We have already obſerved, in the beginning of the article concerning the Hebrew language, that only a few of the deſcendants of Ham, and the moſt profligate of the poſterity of Shem and Japhet, were concerned in building the tower of Babel. We ſhall not now reſume the arguments then collected in ſupport of that poſition; but proceed to inveſtigate the character of that branch of the poſterity of Javan which inhabited Greece and the neighbouring regions.

At what period the coloniſts arrived in theſe parts cannot be certainly determined; nor is it of great importance in the queſtion before us. That they carried along with them into their new ſettlements the language of Noah and his family, is, we think, a point that cannot be controverted. We have endeavoured to prove that the Hebrew, or at leaſt one or other of its ſiſter-dialects, was the primæval language of mankind. The Hebrew, then, or one of its cognate branches, was the original dialect of the Ionim or Greeks.

Be that as it may, before theſe people make their appearance in profane hiſtory, their language deviates very widely from this original archetype. By what means, at what period, and in what length of time this change was introduced, is, we believe, a matter not eaſy to be elucidated. That it was progreſſive, is abundantly certain both from the rules of analogy and reaſon.

The colonies, which traverſed a large tract of country before they arrived at their deſtined ſettlements, muſt have ſtruggled with numberleſs difficulties in the courſe of their peregrinations. The earth, during the period which immediately ſucceeded the univerſal deluge, muſt have been covered with foreſts, interſected with ſwamps, lakes, rivers, and numberleſs other impediments. As the neceſſaries, and a few of the conveniences of life, will always engroſs the firſt cares of mankind, the procuring of theſe comforts will, of neceſſity, exclude all concern about arts and ſciences which are unconnected with theſe purſuits. Hence we think it probable, that moſt of thoſe colonies which migrated to a very great diſtance from the plains of Shinar, which we believe to have been the original ſeat of mankind, in a great meaſure neglected the practice of the polite but unneceſſary modes of civilization which their anceſtors were acquainted with, and practiſed before the era of their migration. Certain it is, that thoſe nations which continued to reſide in the neighbourhood of that centre of civilization, always appear in a cultivated ſtate; while, at the ſame time, the coloniſts who removed to a conſiderable diſtance appear to have ſunk into barbariſm, at a period more early than the annals of profane hiſtory can reach.—This appears to have been the ſituation of the primary inhabitants of Greece. Their own hiſtorians, the moſt partial to their own countrymen that can well be imagined, exhibit a very unpromiſing picture of their earlieſt progenitors. Diodorus Siculus, in delineating the character of the original men, we believe ſketches his draught from the firſt inhabitants of Greece *. He repreſents them as abſolute ſavages, going out in ſmall parties to make war upon the wild beaſts of the field, which (according to him) kept them in continual alarm. "Neceſſity obliged them to band together for their mutual ſecurity; they had not ſagacity enough to diſtinguiſh between the wholeſome and poiſonous vegetables; nor had they ſkill enough to lay up and preſerve the fruits of autumn for their ſubſiſtence during the winter." The ſcholiaſt on Pindar deſcribes the ſituation of the inhabitants of Peloponneſus in the following manner †. "Now ſome have affirmed that the nymphs, who officiated in performing the ſacred rites, were called *Meliſſæ*. Of theſe Mnaſeas of Patara gives the following account. They prevailed upon men to relinquiſh the abominable practice of eating raw fleſh torn from living animals, and perſuaded them to uſe the fruits of trees for food.—Meliſſa, one of them, having diſcovered bee-hives, ate of the honey-combs, mingled the honey with water for drink, and taught the other nymphs to uſe the ſame beverage. She called bees Μελισσαι *Meliſſæ*, from her own name, and beſtowed much care on the management of them.

127 who were long a barbarous people.

* Lib. i.

† Python. Ode 4.

128 Progreſs of their civilization.

"Theſe things (ſays he) happened in Peloponneſus; nor is the temple of Ceres honoured without nymphs, becauſe they firſt pointed out the mode of living on the fruits of the earth, and put an end to the barbarous practice of feeding on human fleſh. The ſame ladies, too, from a ſenſe of decency, invented garments made of the bark of trees."

Hecatæus the Mileſian, treating of the Peloponneſians, affirms*, "that before the arrival of the Hellenes, a race of barbarians inhabited that region; and that almoſt all Greece was, in ancient times, inhabited by barbarians †. In the earlieſt times (ſays Pauſanias) (o) barbarians inhabited moſt part of the country called *Hellas*." The original Greeks, if we may believe an author of deep reſearch and ſuperior ingenuity ‡, were ſtrangers to all the moſt uſeful inventions of life. Even the uſe of fire was unknown till it was found out and communicated by Prometheus, who is thought to have been one of the firſt civilizers of mankind. Hence Æſchylus §, introduces Prometheus commemorating the benefits which he had conferred upon mankind by his inventions, in a ſtrain that indicates the uncultivated ſtate of the world prior to the age in which he flouriſhed. For the entertainment of our readers, we ſhall tranſlate as much of that paſſage as ſuits our preſent purpoſe.

* Strabo, lib. vii.

† Id. lib. i.

‡ Plin. Nat. Hiſt.

§ Prometh. verſe 441.

——————" Of the human race
Now hear the tale, how fooliſh erſt they were:
I taught them thought and exerciſe of reaſon;
If aught they ſaw before, they ſaw in vain.
Hearing, they heard not; all was ſhapeleſs dreams
For a long ſpace of time, at random mixt

(o) The Greeks borrowed this contemptuous epithet from the Egyptians. See *Herod.* lib. ii. cap. 158.

In wild confuſion: for they neither knew
Tile-cover'd houſes ſtanding in the ſun,
Nor timber work; but, like the earth-bred ant,
They lodg'd in ſunleſs caves dug under ground:
No certain ſign had they of winter cold,
Nor of the flow'ry ſpring, or ſummer ſtore,
But blindly manag'd all; till I them taught
What time the ſtars appear, what time they ſet,
Hard to be ſcan'd: then arithmetic rare,
That queen of arts, by dint of patient thought
Deſcry'd, I taught them; and how vocal ſounds
From letters join'd aroſe."

This character, though applied to mankind in general, was in reality that of the moſt ancient Greeks. Theſe forbidding features had been tranſmitted to the poet by tradition as thoſe of his anceſtors: he was a Greek, and of conſequence imputes them to all mankind without diſtinction.

Phoroneus, the ſon and ſucceſſor of Inachus *, is ſaid to have civilized the Argives, and to have taught them the uſe of ſome new inventions. This circumſtance raiſed his character ſo high among the ſavage aborigines of the country, that ſucceeding ages † deemed him the firſt of men. Pelaſgus obtained the like character, becauſe he taught the Arcadians to live upon the fruit of the *fagus*, to build ſheds to ſhelter them from the cold, and to make garments of the ſkins of ſwine.

But what clearly demonſtrates the unpoliſhed character of the moſt ancient Greeks is, the extravagant honours laviſhed by them upon the inventors of uſeful and ingenious arts. Moſt of theſe were advanced to divine honours, and became the objects of religious worſhip to ſucceeding generations. The family of the Titans affords a moſt ſtriking inſtance of this ſpecies of adulation. Jupiter, Juno, Mars, Apollo, Venus, Diana, &c. were ſprung of this family. By the uſeful inventions which theſe perſonages communicated to the uncultivated nations of Greece, they obtained ſuch laſting and ſuch extravagant honours, that they juſtled out the ſidereal divinities of the country, and poſſeſſed their high rank as long as Paganiſm prevailed in thoſe regions. To theſe teſtimonies of the ſavagiſm of the original Greeks, others almoſt without number might be added; but thoſe adduced in the preceding part of this inquiry will, we hope, ſatisfy every candid reader as to the truth of the poſition advanced.

129
A new colony arrives in Greece called *Pelaſgi*.

While matters were in this ſituation with reſpect to the primitive Jonim or Greeks, a new colony arrived in thoſe parts, which in a few years conſiderably changed the face of affairs. The people who compoſed this colony were called *Pelaſgi;* concerning whoſe origin, country, character, and adventures, much has been written, and many different opinions exhibited by the learned. It is not our province to enter into a detail of their arguments and ſyſtems; we ſhall only inform our readers, that the general opinion is, that they were natives either of Egypt or Phœnicia. We have ſeen a diſſertation in manuſcript upon this ſubject, from which we are allowed to extract the following particulars.

The author, we think, has proved by very plauſible arguments, that theſe people could not be deſcendants of the Egyptians nor Phœnicians. He maintains, that the Pelaſgi were a great and numerous tribe; that they overſpread all the coaſt of Aſia Minor from Mount Mycale to Troas; that they were maſters at one time of all the Aſiatic and Grecian iſlands; that they overran Greece and many of the neighbouring countries; and all this in leſs than half a century.—Theſe facts he ſeems to have proved from Homer, Herodotus, Diodorus Siculus, Pauſanias, and other Greek authors of approved authenticity. He ſhows, that they were a civilized generation; that they were well acquainted with military affairs, legiſlation, agriculture, navigation, architecture, letters, &c. He inſiſts, that Phœnicia could not at any given period have furniſhed ſuch a numerous body of emigrants, even ſuppoſing the whole nation had emigrated, and left their native country a deſert. He believes that this event took place before the invaſion of Canaan by the Iſraelites; that conſequently the Pelaſgic migration was not occaſioned by that cataſtrophe. He has ſhown, we think by very probable arguments, that the Egyptians in the earlieſt ages were averſe to foreign expeditions, eſpecially by ſea; becauſe that people hated this element, and beſides could be under no temptation to emigrate: add to this, they were accuſtomed to live on ſmall matters, and their country was exceedingly fertile and eaſily cultivated. It appears (ſays he) from Herodotus, that the Pelaſgi were not acquainted with the religion of the Zabians, which could not have been the caſe had they emigrated from either of theſe countries. He makes it appear, at leaſt to our ſatisfaction, that Herodotus is miſtaken when he ſuppoſes that the deities of Greece were derived from Egypt. He demonſtrates, that the names of the greateſt part of thoſe deities are of Phœnician extraction; and this opinion he eſtabliſhes by a very plauſible etymological deduction. He aſſerts, that had the Pelaſgi been natives of either of the countries above-mentioned, it would be abſurd to ſuppoſe them ignorant of the names and religious rites of their reſpective nations. He finds, that the Egyptian and Phœnician colonies, which afterwards ſettled in Greece, were enemies to the Pelaſgi, and either ſubdued or expelled them the country, which, he imagines, would ſcarce have been the caſe had both parties ſprung from the ſame anceſtors. After ſettling theſe points, he concludes, that the people in queſtion were the progeny of the Arabian ſhepherds, who, at a very early period, invaded and ſubdued both the Lower and Upper Egypt. After poſſeſſing that country about a century and a half, they were conquered by Amenophis king of the Upper Egypt, who drove them out of the country. Upon this the fugitives retired to Paleſtine, where Manetho the Egyptian hiſtorian loſes ſight of them, and either through malice or ignorance confounds them with the Iſraelites. This writer ſuppoſes that thoſe fugitives gradually directed their courſe for the weſt and north-weſt coaſts of Aſia Minor, whence they conveyed themſelves over to Greece.

Such are the arguments by which the author of the diſſertation above mentioned ſupports his hypotheſis. It is, for aught we know, altogether new, and to us it appears by no means improbable. If our curious readers ſhould wiſh to know more of this ſubject, they may conſult Gebelin's preliminary Diſcourſe to his Greek Dictionary, Lord Monboddo's inquiry into the Origin and Progreſs of Language, vol. i. towards the end, and Mr Bryant's Analyſis of Ancient Mythology, &c.

Be this as it may, nothing is more certain than that the Pelaſgi were the firſt people who in ſome degree civilized the ſavages of ancient Greece. It is not our

* Plato.

† Pauſan. lib. viii. c. 1.

Greek Language. [illegible]

before, at greater length, enumerate the many uſeful inventions which they communicated to the Greeks, at that time little than barbarians. We deem it, however, abſolutely neceſſary, as an introduction to our ſubject, to beſtow a few animadverſions on the language and letters of thoſe adventurers; a point ſtrictly connected with the ſubject now under conſideration.

Whether we ſuppoſe the Pelaſgi to have been the offſpring of the Phœnicians, Egyptians, or Arabian ſhepherds, it will make little difference as to their language; every man of reading and reflection is convinced that theſe three nations, eſpecially at that early period, ſpoke a dialect of the Hebrew. The Pelaſgi, then, muſt have ſpoken a dialect of that language, when they arrived in Greece. Perhaps it might have undergone ſome ſmall changes, and acquired ſome new improvements, during ſo many years as had paſſed ſince they began to be a ſeparate ſociety, and in the courſe of ſo many peregrinations. Some monuments of theirs that remain prove this fact beyond all contradiction. As theſe people incorporated with the aborigines of Greece, the remains of the original language of mankind, or at leaſt ſome dialect of it, muſt have been retained by them, gradually coaleſced with that of the new ſettlers. From this, we think, it is obvious, that prior to the arrival of the new colonies from the Eaſt, the language then current among the two united tribes, muſt have been a dialect of the Phœnician, Arabian, Hebrew, &c. Be that as it may, Herodotus * affirms that the Pelaſgi in his time ſpoke a barbarous language, quite unintelligible to the modern Greeks.

* Lib. i. cap. 57.

The reaſon of this difference between the language of the Hellenes or Greeks in the age of Herodotus, and that of the remains of the Pelaſgi at that period, ſeems to be this: Prior to the time of that hiſtorian, the Greek language had, from time to time, undergone many changes, and received vaſt improvements; whereas, on the contrary, that of the remnant of the Pelaſgi, who were now reduced to a very low ſtate, had remained ſtationary, and was then juſt in the ſame predicament in which it had been perhaps a century after their arrival in the country.

As the Pelaſgi, as we obſerved above, were a people highly civilized and well inſtructed in the various arts at that time known in the eaſtern world, they were ſkilled in agriculture, architecture, muſic, &c. (P). The preſumption then is that they could not be unacquainted with alphabetical writing. This moſt uſeful art was well known in the countries from which they emigrated; and of courſe it is impoſſible to imagine that they did not import this art as well as the others above mentioned. Diodorus Siculus imagines that † the Pelaſgi knew not the uſe of alphabetical letters, but that they received them from Cadmus and his Phœnician followers; that thoſe letters were afterwards called *Pelaſgic*, becauſe the Pelaſgi were the firſt people of Greece who adopted them. This account muſt go to the ſcore of national vanity, ſince very ſoon after he acknowledges * that Linus wrote the exploits of the firſt Bacchus and wrote other romantic fables in Pelaſgic characters; and that Orpheus, and Pronapides the preceptor of Homer, employed the ſame kind of letters. Zenobius likewiſe informs us † that Cadmus found Linus teaching characters differing from his. Theſe letters could be none other than the Pelaſgic.

† Lib. iii.

* Ibid.

† Zenob. [illegible]

Pauſanias, in his Attics, informs us, that he found the oldeſt inſcription upon the tomb of Corœbus, who lived under the firſt reign Cecrops, who was contemporary with Phoroneus, the king of the Argives. This inſcription was prior to the arrival of Cadmus, and conſequently letters were known in Greece before they were introduced by that chief. It likewiſe appears from Herodotus himſelf, that the Ionians were in poſſeſſion of alphabetical characters before the coming of the Phœnicians. "For (ſays he *), the Ionians having received letters from the Phœnicians, changing the figure and ſound of ſome of them, adopted them as their own, and in this manner continued to call them Phœnicians." If, then, the Ionians (Q) changed the Phœnician characters, only altering ſome, it is evident that they had alphabetical characters of their own.

49. [illegible]

* Lib. v.

Beſides theſe hiſtorical proofs of the exiſtence of Pelaſgic characters, monuments bearing inſcriptions in thoſe letters have been diſcovered in ſeveral parts of Greece and Italy, which prove this point beyond the reach of controverſy. What characters theſe were may be eaſily determined. As the Pelaſgi emigrated from Arabia, the preſumption is that their letters were Phœnician. They are held by Dr Swinton to have been 13 in number, whereas the Phœnician alphabet conſiſted of 16. The three additional letters were probably invented by the latter people after the Pelaſgi had left the eaſtern quarters. The Pelaſgic letters imported by the Pelaſgi were, doubtleſs, of a rude and clumſy contexture, unfavourable to expedition in writing, and unpleaſant to the ſight. Beſides, the Phœnician characters had not as yet received their names; and accordingly the Romans, who derived their letters from the Arcadian Pelaſgi *, had no names for theirs. The probability is, that prior to this era the Pelaſgic letters had not been diſtinguiſhed by names. There were of courſe no other than the original letters of the Phœnicians in their full uncouth and irregular form; and for this reaſon they eaſily gave way to the Cadmean, which were more beautiful, more regular, and better adapted to expedition.

* Livii lib. i. c. 7.

Plate XV.

Hitherto we have ſeen the Pelaſgi and the Ionians incorporated, living under the ſame laws, ſpeaking the ſame language, and uſing the ſame letters. But another nation, and one too of vaſt extent and populouſneſs, had at an early period taken poſſeſſion of a conſiderable part of the country afterwards diſtinguiſhed by the name of *Hellas* or *Greece*. The Thracians were a great and mighty nation; inferior to none except the Indians ‡, ſays the father of Grecian hiſtory. Theſe people at a very early period, had extended their conqueſts over all the northern parts of that country. They were, in ancient times, a learned and poliſhed nation. From them,

‡ Herod. lib. v. c. 3.

50. The Thracians a learned [illegible] at a very early period.

(P) The Arcadians, who were a Pelaſgic tribe, were highly celebrated for their ſkill in muſic. They introduced this art into Italy. See *Dion. Halicar.* lib. i.

(Q) The Athenians were originally called *Ionians*.

Greek language.

in succeeding ages, the Greeks learned many useful and ornamental sciences. Orpheus (R) the musician, the legislator, the poet, the philosopher, and the divine, is known to have been of Thracian extraction. Thamyris and Linus were his disciples, and highly respected among the Greeks for their learning and ingenuity. That these people spoke the same language with the Greeks, is a [illegible] from the connexion between them and these Thracian bards. The Thracian language, then, whatever it was, contributed in a great proportion towards forming that of the Greeks. From the remains of the Thracian dialect there appears to have been a very strong resemblance between it and the Chaldean. This position we could readily support by the most plausible etymological deduction, did the limits prescribed us in this article admit such an inquiry. It appears, however, that the * Thracians, Getæ, and Daci or Davi, spoke nearly the same language. The Goths, so much celebrated in the annals of the lower empire, were the descendants of the Getæ and Daci, and consequently retained the dialect of their ancestors. The reader, therefore, must not be surprised, if in tracing the materials of which the Greek language is composed, we should sometimes have recourse to the remains of the Gothic.

* *Strabo*, lib. vii.

131 The Greek language composed of three different dialects.

We have now found out three branches of the Greek language; that of the Ionian or [illegible], that of the Pelasgic tribe, and that of the Thracians. These three, we imagine, were only different dialects of the very same original tongue. This assertion we could readily prove by the comparison of a great number of words taken from the two last, were this a proper place for such a discussion.

132 Arrival of Cadmus in Greece.

Some centuries after the arrival of the Pelasgi, Cadmus, an Egyptian (S) by birth, and a sojourner in Phœnicia, arrived in Bœotia with a multitude of followers. This colony-chief and his countrymen introduced letters and several other useful improvements into the country in question. As these people were natives of Phœnicia and its environs, their alphabet was that of their native country, consisting of 16 letters. That the Phœnician alphabet was nearly the same with the Samaritan and Hebrew, has been so often and so clearly demonstrated by the learned of this and the former century, that it would be altogether superfluous to insist upon it in this short inquiry. The Phœnicians, as is generally known, wrote from right to left, and the old Grecian characters inverted, exactly resemble the other.

† *Scaliger.*

133 The letters introduced by him.

The names of the Cadmean characters are Syriac †, which shows the near resemblance between that language and the Phœnician. They stand thus, *alpha*, *beta*, *gamma*, *delta*, &c. The Syrians used to add *a* to the Hebrew vocables, hence aleph becomes alpha, beth, betha or beta, &c. In the Cadmean alphabet we find the vowel letters, which is an infallible proof that this was the practice of the Phœnicians in the age of Cadmus; and this very circumstance furnishes a presumption that the Jews did the same at the same period.

After all, it is evident that the old Greek letters, which were written from right to left, differ very little from those of the Pelasgi. The four double letters θ, φ, χ, ψ, are said to have been added by Palamedes about [illegible] years before the siege of Troy. Simonides is generally supposed to have added the letters ζ, η, ω, though it appears by some ancient inscriptions that some of these letters were used before the days of Palamedes and Simonides.

In the year of our Lord 1456 seven brazen tables were discovered at Eugubium, a city of Umbria on the Apennines, of which five were written in Pelasgic or Etruscan characters and two in Latin. The oldest of these tables is thought to have been composed about 168 years after the taking of Troy, or [illegible] years before Christ. By comparing the inscriptions on these tables with the old Ionic characters, the curious have been enabled to discover the resemblance.

134 The old Ionic character.

The old Ionic character wrote from right to left, and continued in general use for several centuries: It was composed of the Cadmean and Pelasgic characters, with some variations of form, position, and number. The Athenians continued to use this character till the year of Rome [illegible]. The old Ionic was gradually improved into the new, and this quickly became the reigning mode. After the old Ionic was laid aside, the * βουστροφηδον, or bustrophedon came into custom, which goes backwards and forwards as the ox does with the plough. They carried the line forward from the left, and then back to the right. The words were all placed close together, and few small letters were used before the tenth century. If our curious readers would wish to know more of letters and alphabets, we must remit them to Chishull, Morton, Postellus, the great Montfaucon, Gebelin, Astle, &c. For our part we are chiefly concerned at present with the Phœnician and Cadmean systems, and on these perhaps we may have dwelt too long. Having now, we hope, sufficiently proved that the Greek alphabet was derived from the Phœnician, in order to convince our curious but illiterate readers of the certainty of our position, as it were by ocular demonstration, we shall annex a scheme of both alphabets, to which we shall subjoin some strictures upon such letters of the Greek alphabet as admit any ambiguity in their nature and application.

* *Pausanias*, lib. v. cap. 17.

135 The Greek alphabet derived from the Phœnician.

A, *alpha*, had two sounds, the one broad like *a* in the English word *all*; the other slender, as *a* in *end*, *spend*, *defend*. The Hebrews certainly used it so, because they had no other letter to express that sound; the Arabs actually call the first letter of their alphabet *elif*; and they as well as the Phœnicians employ that letter to express both the sound of A and E promiscuously. The Greeks call their letter E ε-ψιλον, that is, E slender, which seems to have been introduced to supply the place of A slender.

H, *eta*, was originally the mark of the [illegible], and no doubt answered to the Hebrew ח. It is still retained in that capacity in the word [illegible], and in words with the *spiritus asper* beginning [illegible]

(R) Orpheus seems to be compounded of two oriental words, *aur* "light," and *phe* "the mouth." [illegible] deduce it from the Arabian *arif* a learned man."

(S) Joseph Scaliger's account of the origin of the Ionic letters. *Euseb. Chron.*

tions, &c. E originally marked both the ſound of Εψιλον and Ητα; that is, it was ſometimes ſounded ſhort as at preſent, and ſometimes long, where it is now ſupplied by H. As it was found convenient to diſtinguiſh theſe two different quantities of ſound by different letters, they adopted H, the former *ſpiritus aſper*, to denote the long ſound of E, and ſubſtituted the preſent *ſpiritus aſper* [ʽ] in its place.

I, *iota*, is the Hebrew or Phœnician *jod* or *yod*. We imagine it originally ſerved the purpoſe of both iota and ypſilon. It had two different ſounds; the one broad and full, the other weak and ſlender. The latter had the ſound of the modern υψιλον. That this was actually the caſe, appears in ſeveral monumental inſcriptions: And upon this depends the variation of ſome caſes of the demonſtrative pronoun and of the ſecond declenſion.

O, *omicron*, or ſmall *o*, in the original Greek had three different ſounds. It ſounded *o* ſhort, as at preſent; and likewiſe *o* long, now denoted by Ω or large *O*. It likewiſe marked the ſound of the improper diphthong ου, ſounded like the Engliſh diphthong *oo*. The Ω was taken from the Phœnician wau or *V*.

Υ, *ypſilon*, we have obſerved before, was adopted to ſupply a mark for the ſound of I ſlender.

Z, *zeta*, is compounded of δς. Dion. Halic. however, informs us, that this letter ſhould be pronounced σδ, according to the Doric plan.

Θ, *theta*, was not known in the old Greek. It is compounded of τ and the *ſpiritus aſper*, both which were of old written ſeparately thus TH.

Ξ, *xi*, is compounded of γς, κς, χς. Theſe letters, too, were originally written ſeparately.

Φ, *phi*. This letter is compounded of β, π, and the *ſpiritus aſper*; thus BH, PH.

X, *chi*, like the foregoing, is compounded of γ, κ, and the *ſpiritus aſper* as above.

Ψ, *pſi*, like ſome of the reſt, is made up of βς, πς, which, too, were originally written in ſeparate characters.

Theſe obſervations are thrown together purely for the uſe of ſtudents who may not chooſe to inquire into the *minutiæ*. We are ſorry that the nature of the work will not permit us to extend our reſearches to greater length. The reader will find an ancient inſcription on Plate CCCCXVI. in which the powers of the letters are exemplified as they were in the firſt ſtage of the Greek language. Every language, we believe, was originally compoſed of inflexible words; the variations which now diſtinguiſh nouns and verbs were the effects of progreſſive improvements. What might have been the ſtate of the Greek language with reſpect to theſe variations in its original form, it is not now poſſible to diſcover. That it was rude and irregular, will not, we imagine, be controverted. One of the firſt attempts towards forming the variations, now denominated *declenſions* and *conjugations*, would probably be made upon the *demonſtrative* article and the *ſubſtantive* verb. This obſervation will be found to hold good in moſt poliſhed languages. In the Greek tongue, this was evidently the method.

136
Origin and flexion of the article.

The original Greek article was imported from the eaſt. It was the Hebrew or Phœnician ה *ha*. This particle ſometimes ſignifies *one*, and ſometimes it anſwers to our demonſtrative *the*; both in its adverbial and demonſtrative capacity it imports demonſtration. In the earlieſt ſtages of the two oriental languages, it was probably written apart, as *ha-melech* "the king." In proceſs of time it came to be joined with the following word, as *Hammelech*. From this we think the Greek article was deduced. It is ſtill retained in the Doric dialect in its priſtine character. The difference between *ho* and *ha* in the eaſtern language is nothing. Here then we have the articles ὁ maſculine and ἁ feminine. Upon theſe ſeveral changes were ſuperinduced, in order to render them more uſeful for the purpoſes of language. For thoſe changes we know of no archetype.

The Greeks then having adopted the Hebrew, or Phœnician, or Chaldean article *ha*, and changed it into *ho* for the maſculine, ſeem to have arranged its variations in the following manner:

	Sing.	*Plu.*
Nom.	ὁ	ὁι
Gen.	ὁυ	ὡν
Dat.	ὁι	ὁις
Acc.	ὁν	ὁυς

137
Its uſe in the flexion of nouns of the firſt and ſecond declenſions.

In the earlieſt ſtages of the Greek language, ι and υ were ſounded in the ſame manner, or nearly ſo, as was obſerved above. The accuſative was at firſt like the nominative; for diſtinction's ſake it was made to terminate in ν, which letter was likewiſe adopted to characterize the genitive plural; ς was annexed to the dative plural, to diſtinguiſh it from the dative ſingular. The radical word was ſtill without inflexion.

When the article was inflected in this manner, the proceſs ſtood as follows: we take λογος for an example.

	Sing.	*Plu.*
Nom.	ὁ λογ *ſpeech*	ὁι λογ *ſpeeches*
Gen.	ὁυ λογ *of ſpeech*	ὡν λογ *of ſpeeches*
Dat.	ὁι λογ *to ſpeech*	ὁις λογ *to ſpeeches*
Acc.	ὁν λογ *ſpeech*	ὁυς λογ *ſpeeches*

In this arrangement our readers will obſerve, that in the time under conſideration, ω was not yet introduced; and therefore ομικρον or little ο was the ſame letter in the genitive plural as in the accuſative ſingular; but in the latter caſe it was ſounded long by way of diſtinction.

The article *ha*, which is ſtill retained in the Doric dialect, was varied as follows:

	Sing.	*Plu.*
Nom.	ἁ	ἁι
Gen.	ἁς	ὡν
Dat.	αι	ἁις
Acc.	ἁν	ἁς

Theſe variations differ a little from thoſe of the maſculine; and they were no doubt made for the ſake of diſtinction, as is uſual in ſuch caſes. We ſhall now give an example of the feminine as it muſt have ſtood before variations were introduced. We ſhall employ τιμη.

	Sing.	*Plu.*
Nom.	ἁ τιμ *honour*	ἁι τιμ *honours*
Gen.	ἁς τιμ *of honour*	ὡν τιμ *of honours*
Dat.	ἁι τιμ *to honour*	ἁις τιμ *to honours*
Acc.	ἁν τιμ *honour*	ἁς τιμ *honours*

Afterwards, when the Chaldean article *da* was adopted for the neuter gender, the letter ד or *d* was changed into τ, and prefixed to it; and then the Greeks, who, in their declenſion of adjectives, always followed the neuter gender, began to prefix it to the oblique caſes.

In this manner we think the Greek nouns ſtood originally; the only change being made upon the article. At length, inſtead of prefixing that word, and expreſſing it by itſelf, they found it convenient to affix a fragment of it to the noun, and ſo to pronounce both with more expedition. Thus ὁς λογ, e. g. became λογ-ός, ου λογ became λογ-ου, and of courſe λογος and λογου, &c. The *ſpiritus aſper*, or rough breathing, was thrown away, in order to facilitate the coalition. Nouns of the neuter gender, as was neceſſary, were diſtinguiſhed by uſing ν inſtead of ς. In Oriental words the Greeks often change ς into ν, and *vice verſa*.

138 In this mode of flexion the Greeks copied from the Orientals.

In this caſe the Greeks ſeem to have copied from an eaſtern archetype. In Hebrew we find an arrangement exactly ſimilar. To ſupply the place of the pronouns poſſeſſive, they affix fragments of the perſonals: Thus, they write *ben-i*, "my ſon," inſtead of *ben-ani*, and *debir-nu*, "our words," inſtead of *debir-anu*, &c. The perſons of their verbs are formed in the ſame manner. In this way, in our opinion, the variations of the firſt and ſecond declenſions were produced.

139 Formation of the third declenſion, and of its caſes.

After that a conſiderable number of their nouns were arranged under theſe two claſſes, there remained an almoſt infinite number of others which could not conveniently be brought into theſe arrangements; becauſe their terminations did not readily coaleſce with the articles above mentioned. Theſe, like nouns of the neuter gender, were in a manner ſecluded from the ſociety of the two other claſſifications. It is probable that theſe for a long time continued indeclinable. At laſt, however, an effort was made to reduce them into a claſs as well as the others. All theſe excluded nouns originally terminated with ς, which appears from their genitives as they ſtand at preſent. By obſerving this caſe, we are readily conducted to the termination of the priſtine vocable. The genitive always ends in ος, which ending is formed by inſerting ο between the radical word and ς. By throwing out ο we have the ancient nominative: Thus, Τιταν, genitive Τιτανος; taking out ο we have Τιτανς, the original inflexible termination. Αντω, genitive Αντοος; throw out ο and you have Αντος. Παλλας, genitive Παλλαδος; take away ο and there remains παλλαδς. Ορνις, genitive Ορνιθος; by throwing out ο we have Ορνιθς. Αναξ, genitive Ανακτος, Ανακτς. Κρατος, genitive Κρατεος, Κρατης; originally Κρατες, becauſe originally ε had the ſound of η, as was obſerved above. Μελι, genitive Μελιτος, Μελιτς. Ειδος, genitive Ειδεος, Ειδες, the old noun. In ſhort, the genitive is always formed by inſerting ο immediately before ς, which is always the termination of the nominative; and by this rule, we eaſily diſcover the noun ſuch as it was in its original form.

The dative of this declenſion was cloſed with ι *aſcriptum*; the ſame with that of the ſecond, namely, ι *ſubſcriptum*. The accuſative commonly terminates with α; but was originally ended with ν. The Romans imitated the Æolian dialect, and they commonly ended it with *em* or *im*. The Greeks, perhaps, in this imitated their progenitors, for *a* was their favourite vowel. The nominative plural ended in ς, which nearly reſembles the English plural, and was poſſibly borrowed from the Thracians. The genitive plural in all the declenſions ends in ων; the dative ends in σι, the σ being inſerted to diſtinguiſh it from the dative ſingular. When a ſtrong conſonant, which would not eaſily coaleſce with ς, comes immediately before it, that conſonant is thrown out to avoid a harſh or difficult ſound. The ſum then is; the caſes of nouns of the firſt and ſecond declenſions conſiſt of the radical word with fragments of the articles annexed, and theſe were the firſt claſſifications of nouns. The other nouns were left out for ſome time, and might be denominated *neuters*; at length they too were claſſified, and their variations formed as above. In this proceſs the Greeks deviated from the oriental plan; for theſe people always declined their nouns by particles prefixed. Whether the Greeks were gainers by this new proceſs, we will not pretend poſitively to determine. We are, however, inclined to imagine that they loſt as much in perſpicuity as they gained by variety.

140 Greek ablative.

It is generally believed that the Greeks have no ablative; to this opinion, however, we cannot aſſent. It is true, that the dative, and what we would call the *ablative*, are always the ſame: yet we think there is no more reaſon to believe that the latter is wanting in Greek, than that the ablative plural is wanting in Latin, becauſe in that language both theſe caſes are always alike.

141 Genders.

In the eaſtern languages there are only two genders, analogous to the eſtabliſhed order of nature, where all animals are either male or female. But as the people of the eaſt are, to this day, ſtrongly addicted to perſonification, they ranged all objects of which they had occaſion to ſpeak, whether animate or inanimate, under one or other of theſe two claſſes. Hence aroſe what is now called the *maſculine* and *feminine* genders. The orientals knew nothing of a neuter gender, becauſe, indeed, all objects were comprehended under the foregoing claſſes. The Phœnician feminine was formed from the maſculine, by adding אה, *ah*. In this the Greeks in many caſes imitated them. The Greeks and Latins left a vaſt number of ſubſtantives, like a kind of outcaſts, without reducing them to any gender; this proceſs gave riſe to the neuter gender, which imports, that ſuch ſubſtantives were of *neither gender*. This has the appearance of a defect, or rather a blemiſh, in both. Sometimes, too, they make words neuter, which, according to the analogy of grammar, ought to be either maſculine or feminine. And again, they range words under the maſculine or feminine, which by the ſame rule ought to have been neuter. In ſhort, the doctrine of generical diſtribution ſeems to have been very little regarded by the fabricators of both tongues. The beauty which ariſes from variety ſeems to have been their only object.

142 Farther obſervations on the article.

The uſe of the article in the Greek language is, we think, rather indeterminate; it is often prefixed to proper names, where there is no need of demonſtration nor generical diſtinction. On the contrary, it is often omitted in caſes where both the one and the other ſeem to require its aſſiſtance. In ſhort, in ſome caſes it ſeems to be a mere expletive. Though both Lord Monboddo and Mr Harris have treated of this part of ſpeech, neither the one nor the other has aſcertained its proper uſe. (See *Origin and Progreſs of Language*, vol. ii. p. [illegible] *Hermes*, p. 214. *et ſeq.*)—We know not any objection to the early uſe of articles among the Greeks ſo plauſible as the total neglect of them among the Romans. But it ought to be conſidered, that after the flexions were introduced, the uſe of the article was in a great meaſure neglected. Accordingly, Lord Monboddo obſerves that it is very ſeldom uſed as ſuch by Homer, but commonly in place of the relative pronoun ὁς, ἡ, ὁ.—Thus it would appear, that at the time when the Roman language was reduced to the Grecian ſtandard, the article was not commonly uſed by the Greeks; and of courſe the Latins never employed it. There can be no doubt but the pronoun *who*, in the northern languages, is the ſame with the Greek ὁ, and the Hebrew *hua*. This among the northern people is always a relative, which affords a preſumption that the Greeks originally uſed the article in the ſame manner as we do at preſent. The fact is, that the articles having once got into vogue, were often poſitively uſed as mere expletives to fill up a gap; and that, on the other hand, when there was no occaſion for pointing out an object, it being fully determined by the tenor of the diſcourſe, it was often omitted.

143 Adjectives.

In forming adjectives, they followed the ſame plan that they had done with ſubſtantives. Their great effort was to make their adjectives agree with their ſubſtantives in gender, number, and caſe. This arrangement improved the harmony of ſpeech; and nothing could be more natural than to make the word expreſſing the quality correſpond with the ſubject to which it belonged.

As adjectives denote qualities, and thus are ſuſceptible of degrees, nature taught them to invent marks for expreſſing the difference of theſe degrees. The qualities may exceed or fall below each other by almoſt numberleſs proportions; it was, however, found convenient to reſtrict theſe increaſes and decreaſes to two denominations. The poſitive is, properly ſpeaking, no degree of compariſon at all; therefore we need only point out the formation of the comparative and ſuperlative.

The former is generally thought to be fabricated, by firſt adding the Hebrew word יתר, *excellent*, to the poſitive, and then affixing the Greek termination ος; and the latter, by affixing the Syrian word *tath* and the ſyllable ος, in the ſame manner.

144 Greek numerals.

Every nation, even the moſt uncivilized, have early acquired the notion of number. Numerical characters and names are the ſame in many different languages. Theſe terms were diſcovered, and in uſe, long before grammar came to any perfection; and therefore remain either inflexible or irregular. The firſt way of computing among the Greeks was by the letters of the alphabet; ſo that A ſignified *one* and Ω *twenty-four*: in this manner the rhapſodies of Homer are numbered; and ſo are the diviſions of ſome of the Pſalms, as is generally known. But a more artificial plan of computation was obviouſly neceſſary. They divided the letters of the alphabet into *decades* or tens, from A to I=10. To expreſs the number 6, they inſerted ϛ *baw*=6; ſo that by this means the firſt decade amounted to 10. In the next decade every letter increaſed by tens, and ſo P denoted 100. In this decade they inſerted ϟ κοππα=90. In the third, every letter roſe by 100; ſo that ϡ) σανπι=900. By inſerting theſe three Phœnician characters they made their alphabet amount to 900. To expreſs chiliads or thouſands, they began with the letters of the alphabet as before: and to make the diſtinction, they placed a dot under each character, as the units, tens, hundreds, were diſtinguiſhed by an acute accent over them.

But in monumental inſcriptions, and in public inſtruments, a larger and more laſting numerical character was fabricated. They began with I, and repeated that letter till they arrived at Π=5. This is the firſt letter of πεντε, *five*. Then they proceeded, by repeating I till they came to 10 Δ, the firſt letter of δεκα, 10. Then they repeated Δ over and over, ſo that four Δ=40. To expreſs 50, they uſed this method; they incloſed Δ in the belly of |Δ|=50, |H|=500 |M|=50,000 &c. Often, however, X ſignifies 1000, and then we have δις χιλιοι, 2000; τρεις χιλιοι, 3000; and ſo of the reſt.

145 Pronouns.

The word *pronoun* ſignifies a word placed inſtead of a noun or name; and indeed the perſonal pronouns are really ſuch: this needs no explication. The pronoun of the firſt perſon is one of thoſe words which have continued invariable in all languages; and the other perſonals are of the ſame character. The relatives, poſſeſſives, demonſtratives, and gentiles, are generally derived from theſe, as may be diſcerned by a very moderate adept in the language. Our readers will therefore, we hope, eaſily diſpenſe with our dwelling upon this part of ſpeech.

146 Greek verbs, how formed.

Verb. In moſt ancient languages, verbs, according to the order of nature, have only three tenſes or times, namely, the *paſt*, *preſent*, and *future*. The intermediate tenſes were the invention of more refined ages.—The Greek, in the moſt early periods, had no other tenſes but thoſe above-mentioned. The manner of forming theſe we ſhall endeavour to point out, without touching upon the nature of the reſt, ſince an idea of them may be acquired from any common grammar.

We have obſerved above, that the flexion of nouns of the firſt and ſecond declenſions are formed by annexing fragments of the articles to the radical words; and that the variation of the tenſes was produced by joining the ſubſtantive verb, according to the ſame analogy. Every Greek verb was originally an inflexible biliteral, triliteral, quadriliteral or diſſyllabic radix. The variations were formed a long while after in the manner above intimated.

The Greeks had their ſubſtantive or auxiliary verb, from the Phœnician or Chaldean verb היה, *fuit*. This verb, taking away the gentle aſpirate from both beginning and end, actually becomes ει. This vocable the Greeks brought along with them from the Eaſt, and manufactured after their own manner, which appears to have been thus:

Preſ. εω, εες, εε, εομεν εετε, εοσι,
Cont. ω, εις, ει, ουμεν, ειτε ουσι,
Fut. εσω, εσεις, εσει, εσομεν, &c.

We place οσι in the third perſon plural, becauſe for many centuries ομικρον ſupplied the ſound of the diphthong ου. By theſe variations it will appear that the radical verb was rendered capable of inflection. We have obſerved that Greek verbs were a collection of biliteral,

Exemplum Ionicarum Priscarum

Literarum ex columna quæ in via Appia reperta, postea ad hortos
Farnesianos traducta est.

ODE.VI.⊗E.MITON.-METAKINESAI.EK.TO.TPIOPIO.HO

ESTIN.EPI.TO.TRITO.EN.TEI.HODOI.TEI.APPIAI.EN.TOI

HERODO.-AGROI.O.GAR.LOION.TOI.KINESANTI.-MARTUS

DAIMON.ENHODIA.KAI.HOI.KIONES.DEMETROS

KAI.KORES.ANA⊗EMA.KAI.+⊗ONION.⊗EON.KAI.

Sanscrit Alphabet.

Vowels.

अ	आ	इ	ई	उ	ऊ	ऋ	ॠ	ऌ	ॡ	ए	ऐ	ओ	औ	अं	अः
ă or ĕ	ā	ĭe	ee	ŏ	oo	ru	rū	lu	lru	ae	ăi	o	au	un	ah or ach

Connected Vowels.

क का कि की कु कू कृ कॄ कॢ कॣ के कै को कौ कं कः

Consonants.

क	ख	ग	घ	ङ	च	छ	ज	झ	ञ	ट	ठ	ड	ढ	ण	त	थ	द
kĕ	khĕ	gu	ghu	ŭ or ngĕ	chă	chha	jă	jha	nya	tă	thă	dĕ	dhĕ	nĕ	tĕ	thĕ	dĕ

ध	न	प	फ	ब	भ	म	य	र	ल	व	श	ष	स	ह	क्ष	ज्ञ
dhĕ	nĕ	pa	pha	bĕ	bhĕ	mĕ	yĕ	rĕ	lĕ	vĕ	să	sha	sah	hă	kshă	jnya or gya

[illegible]

literal, triliteral, or quadriliteral, radical words.—The following may serve for examples: τι, λεγ, Μαρ, τυπ, φαν, ταν ραπ, Δαμ, Δηλ, Δειπ.

Theſe radicals are taken at random; and we believe our Grecian ſtudent, by adding the terminations, will readily find them all ſignificant verbs. With theſe radicals, then, and the ſubſtantive verb, we ſuppoſe the preſent and future tenſes were formed.

147 Original preſent that which is now the ſecond future.

But it is now generally admitted that the modern preſent was not the original one of the verb. The ſecond, or Attic future, appears plainly to have been the moſt ancient preſent. When the language was improved, or rather in the courſe of being improved, a new preſent was invented, derived indeed from the former, but differing widely from it in its appearance and complexion. Upon this occaſion, the old preſent was degraded, and inſtead of intimating what was *doing at preſent*, was made to import what was immediately to be done hereafter. By this means, γραφεω, contracted into γραφῶ, *I am writing*, came to intimate *I am juſt going to write*. This change was probably made for the ſake of enriching the language, for variety, for energy. Thus, τυπεω contracted τυπῶ became τυπτω, τικῶ, τικτω, &c. According to this theory, we find, that ſuch verbs as now have no ſecond future retain their original form, only the circumflex has been removed in order to accommodate them to the general ſtandard. Grammarians have now choſen the three characteriſtic letters of active verbs from the preſent, firſt future, and perfect. The true characteriſtic of the original verb was that of the preſent ſecond future. Many verbs are now deſtitute of that tenſe, becauſe ſince the invention of the new preſent, thoſe have fallen into diſuſe.

148 Formation of the modern preſent.

Let us now take the verb λεγω, *dico*, in order to make a trial; and let us write the radix and the auxiliary, firſt ſeparately, and then in conjunction: Thus,

λεγ-εω, λεγ-εις, λεγ-εε, λεγ-εομεν, λεγ-εετε, λεγ-εουσι. Then we will have contracted λεγῶ, λεγεῖς, λεγεῖ, λεγοῦμεν, λεγεῖτε, λεγουσι. Here, we believe, every thing is ſelf-evident.

The Engliſh would run thus: Saying *I am*, ſaying *thou art*, ſaying *he is*, &c. At firſt the radix and the auxiliary were pronounced ſeparately, as we do our helping verbs in Engliſh, and would have been written in the ſame manner had words been then diſtinguiſhed in writing.

149 Firſt future, and

The preſent firſt future occupied the ſame place that it now does, and concurred in its turn to complete the future in conjunction with the radix. That the ſubſtantive verb was inflected in the manner above laid down, is obvious from its future middle εσομαι, and from the future of the Latin verb *ſum*, which was of old *eſo*, *eſis*, &c. Verbs in λω, μω, νω, ρω, often take σω in the firſt future. See *Fœd. Cret. ap. Marm. Oxon.* lib. 87. Verbs in λω and ρω aſſume σ by analogy, as κελλω, κελσω, *Eurip. Hecub.* v. 1057. κελσαι *Hom. Od.* x. v. 511. τελλω, τελσω, *unde* τελσον, *Il.* x. v. 707. ορω. ορσομεν, *Pind. Nem. Od.* 9. *Duodec.* 2. τειρω, τερσει, *Theoc. Idyll.* 22. v. 63. In fine, the Æolic dialect after the liquids often inſerts σ.

It muſt be obſerved, that the Greeks, in order to accelerate the pronunciation, always throw out the ε and ο, except in verbs ending in αω, εω, οω; where they generally change them into η and ω. When the laſt letter of the radix can coaleſce with σ after ε is thrown out, they transform it, ſo as to anſwer the purpoſe; if not, they ſometimes throw it out. We ſhall once more take λεγω for an example:

λεγ εσω, λεγ εσεις, λεγ εσει, &c.

Throwing out ε, it would ſtand λεγ σω, λεγ σεις, &c. by changing γς into ξ it becomes λεξω. As δ and τ can not coaleſce with σ, therefore they throw them out: thus, Αδω, future firſt ασω; πληθω, future firſt πλησω; Ανυτω, Ανυτω, &c.

Theſe are the general rules with reſpect to the formation of the preſent and future of active verbs in the earlieſt ſtages of the Greek language. The limits preſcribed will not allow us to purſue theſe conjectures; but the reader may, if he thinks proper, carry them a great way.

150 preterite tenſe.

The preterite tenſe falls next under conſideration. If we may truſt analogy, this, as well as the other two, muſt have owed its conformation to the radix of the verb, and ſome other word fitted to eke out its terminations. It has been thought by ſome critics, that this addition was taken from the Hebrew word היה; and we ſhould be of the ſame opinion did not another auxiliary preſent itſelf nearer home, which appears to us much more congruous to ſuch a purpoſe. Perhaps, indeed, the people from whom we ſuppoſe it borrowed, derived it from the eaſtern quarters. We have already obſerved, that the Thracians were maſters of a great part of Greece in the very earlieſt ages. At that time they were a polite and learned people. From them a conſiderable part of the Greek language was derived. If, therefore, we ſhould find a word in their language employed for the ſame purpoſe, and accommodated to coaleſce with the radical verb, we feel ourſelves very much inclined to prefer ſuch a word.

151 Origin of the auxiliary verb.

The word *ha* pervades many different languages as an auxiliary verb. From it we have the Italian *ho*, the Spaniſh *he*, the French *ai*; and in one ſhape or other it appears in all the German and Scandinavian dialects. It is the Gothic auxiliary; and, we believe, it forms the termination of the perfect active of the firſt conjugation in the Latin tongue: For there *am* is the radix of *amo*; in the preterite *am-avi*, *amavi*, and the preterperfect *am-hav-eram*, i. e. *amaveram*, compounded of *am*, *hav*, and *eram*, the imperfect of the indicative of the ſubſtantive verb. This proceſs, in the formation of the preterite of Latin verbs, will ſcarce be queſtioned, and forms certainly a preſumptive proof that the Greeks purſued the ſame line. From this verb is likewiſe derived the Latin *habeo*, by changing *v* into *b*, which are indeed the ſame letter. Our readers, after this detail, will not be ſurpriſed if we ſhould now hazard a conjecture, and declare it as our opinion, that this ſame Gothic auxiliary *ha* is actually the additional part of the preterite of Greek verbs, and that part upon which the conjugation depends.

In forming this combination between the radix and the auxiliary, the Greeks were obliged to fabricate ſeveral devices. As often as the laſt letter of the radix could not unite with the aſpirate in *ha*, they metamorphoſed it into one of the double letters, which are capable of coaleſcing with it. In the verb λεγω, γ was changed into χ; thus, λεγ *ha* became λεχα, the preterite τυπ *ha*, was combined into τυφα. In verb

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which had a radix that would not admit this conjunction, they hardened the *h* into κ, as in τιω, preterite τικα, Ακεω κα. Many other ways were contrived to facilitate this re-union. Theſe are detailed in every Greek grammar, and ſo need not be mentioned.—What has been ſaid with reſpect to this configuration, we offer as a pure conjecture, without the moſt remote intention of obtruding it upon our readers.

If it is admitted, that the auxiliary *ha* formed the conjugating termination of the active verb among the Greeks, it will likewiſe be admitted, that the radical verb and the other made originally two diſtinct words: that, according to this ſcheme, the preterite would proceed thus, λεγ *ha*, ſaid *I have*; λεγ *has*, ſaid *thou haſt*; λεγ *he*, ſaid *he hath*, &c. This proceſs to us appears rational, elegant, and advantageous. The pluperfect was not then invented, and therefore it does not come under our conſideration. The other tenſes were all deduced from thoſe deſcribed; and in forming theſe intermediate diſtinctive tenſes, we believe that both critics and grammarians, and perhaps philoſophers too, were employed. See GRAMMAR.

The eaſtern nations have diverſified their verbs, by affixing fragments of the perſonal pronouns to the radix, by which they gained only the advantage of exhibiting the genders of the perſons engaged in being, acting, and ſuffering; but a perpetual repetition of theſe was unavoidable. The Greeks, by their artificial combination of the radix with the two auxiliaries, avoided the neceſſity of repeating their perſonal pronouns, as we and the other modern inhabitants of Europe are obliged to do; and at the ſame time, by diverſifying the terminations of their nouns and verbs, wonderfully improved the beauty and harmony of their language. The arrangement above inſiſted on is ſo very different from that of the orientals, and ſo entirely Gothic, that we think there can be no doubt that the Greeks borrowed this manœuvre from the Thracians. Every perſon moderately acquainted with the Greek language will, upon examination, diſcover a wonderful coincidence between the ſtructure, idioms, and phraſeology, of the Engliſh and Greek languages; ſo many congenial features muſt engender a ſtrong ſuſpicion that there once ſubſiſted a pretty intimate relation between them.

In the preceding deduction, we find ourſelves obliged once more to differ from the very learned author of the *Origin and Progreſs of Language*. As we took the liberty to queſtion his originality of the Greek language, and at the ſame time preſumed to attack the goodly ſtructure raiſed by philoſophers, critics, and grammarians; ſo we now totally differ from that learned writer as to his theory of the creation of verbs out of the inhabile matter of αω, εω, &c. This whole fabric, in our opinion, leans on a feeble foundation.

The apparatus of intermediate tenſes, of augments, derivation of tenſes, with their formation, participles, and idiomatical conſtructions, and other eſſentials or appendages, we omit, as not coming within the verge of the diſquiſition.

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The derivation and formation of the middle and paſſive voices, would certainly afford matter of curious ſpeculation; but the labour neceſſary to inveſtigate this connection would greatly overbalance the benefit expected.

152
Derivation and formation of the middle voice,

However, to complete our plan, we ſhall ſubjoin a few ſtrictures with reſpect to the formation of the middle voice, which was, in our opinion, immediately formed from the active.

We have ſeen already, that the active voice in its original ſtate was formed by annexing fragments of the ſubſtantive or auxiliary verb to the radix. The ſame economy was obſerved in fabricating the flexible parts of the verb of the middle voice. To demonſtrate this, we ſhall firſt conjugate the preſent tenſe of the auxiliary paſſive upon the principles above laid down.

Preſent, Εομαι, εεσαι, εεται, εομεθα, εεσθε, εονται. Such was the paſſive-preſent of the auxiliary. We ſhall now take our example from the verb τυπτω; ſecond future τυπ-εομαι, *ſtruck I am*, τυπ-εεσαι, *ſtruck thou art*, τυπ-εεται, *ſtruck he is*, &c. contracted τυπουμαι, τυπη, τυπειται. The conjunction and formation here is obvious. Perhaps, in the ſecond perſon, σ was inſerted, which, however, is thrown out in the proceſs of the perſons. The future middle is clearly formed, by affixing the future-paſſive of the verb ἐω, only as η was introduced into the language for ε long, it was generally (T) ſubſtituted inſtead of that vowel in verbs ending in αω and ω, and ω for ο in verbs ending in οω; the two vowels ε and ο being originally long as well as ſhort, till η was adopted to denote the long ſound of the former, and ω that of the latter. In many verbs, before the conjunction of the radix and auxiliary, ε was thrown out: thus, τυπ-εσομαι became τυψομαι, λεγ-εσομαι, λεξομαι, &c.

Plate CCCCXV.

The preterite was deduced from that of the active by a very ſlight variation, ſo trifling, indeed, that it need not be mentioned; only we may obſerve, that the aſpirate *h* is never retained in this tenſe, which originally ſeems to have been the only diſtinguiſhing character by which that tenſe of the middle voice differed from the ſame tenſe of the active.

From the ſtrict analogy between the mode of forming the three primary tenſes of the active and middle voice, we are led to ſuſpect that what is now the middle was originally the paſſive voice.

The immediate formation of the former, by annexing the paſſive auxiliary, is obvious. The middle voice ſtill partakes of the paſſive ſignification, ſince it has ſometimes a paſſive, though more frequently an active. There are ſeveral parts of the preſent paſſive quite analogous to the ſame tenſes in the middle: and, laſtly, it is the common progreſs, in the courſe of improvement, to proceed ſtep by ſtep, and by approximation. What is moſt ſimple and eaſy is the firſt object, then ſucceeds what is only a little more difficult, and ſo on till we arrive at the laſt ſtage, when human ingenuity can go no farther. Now, it will readily be admitted, that the paſſive voice is much more embarraſſed and intricate in its texture than the middle; and, therefore, the

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(T) We ſay generally, becauſe in verbs ending in εω, the ε is ſometimes retained, as τελεω, τελεσω, αρκεω-εσω.

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the former ſhould have been poſterior in point of time to the latter.

We are well aware, that the very learned Kuſter, and moſt other moderns, deeply ſkilled in the origin, progreſs, and ſtructure, of the Greek language, have thought otherwiſe. The general opinion has been, that the Greek middle voice anſwered exactly to the Hebrew conjugation *hithpuchal*, and in its priſtine ſignification imported a reciprocality, or when the *agent acts upon itſelf*. For our part, we only intended a few hints upon the ſubject, which our learned readers may purſue, approve, or reject, at pleaſure.

153 and of the paſſive.

If we might pretend to inveſtigate the formation of the paſſive voice, we ſhould imagine that the modern preſent was formed from the ancient one, by inſerting ſuch letters as were found neceſſary for beauty, variety, energy, &c.; the firſt future from the ſecond future middle of the verb τιθημι, once θεω. This future is θησομαι; and, joined to the radix, always occupies that place, τι-θησομαι, τιλεθησομαι, φλεχθησομαι, τυφθησομαι, and ſo of the reſt: whether μαι, σαι, ται, which occur ſo frequently as the terminations of the middle and paſſive voices, are fragments of ſome obſolete verb, we will not pretend to determine.

From verbs in αω, εω, οω, υω, are formed verbs in μι; which in the preſent, imperfect, and ſecond aoriſt, as it is called, only have a different form, by aſſuming μι with a long vowel preceding it, in the preſent active; which vowel is preſerved in each perſon ſingular. This collection of irregular verbs ſeems to be formed from the verb ειμι, which in ſome dialects might be ημι. Indeed the imperfect ην, ης, η, ſeems to imply as much: in this, however, we dare not be poſitive.

In the whole of this analyſis of the formation of verbs, we have laid down what to us appears moſt plauſible. That metaphyſical critics may diſcover inaccuracies in the preceding detail we make no doubt; but our candid readers will doubtleſs reflect, that no language was ever fabricated by philoſophers, and that the elements of language were hammered out by peaſants, perhaps by ſavages. Critics have created a philoſophy of language we admit, and have a thouſand times diſcovered wonderful acuteneſs and ingenuity in the mechaniſm of words and ſentences, where the original onomathetæ never apprehended any, and which poſſibly never exiſted but in their own heated imagination. If our more enlightened readers ſhould find any thing in the preceding detail worthy their attention, ſo much the better; if the contrary ſhould happen, we preſume they will take up with the hackneyed ſyſtem. We have all along neglected the dual number, becauſe it regularly follows the type of the other numbers.

Be that as it may, before we drop this ſubject we muſt take the liberty to ſubjoin an obſervation or two with reſpect to the conſequences of the practice of new modelling the preſent, and of courſe the imperfect, tenſes of verbs. 1ſt, After this arrangement they commonly retained all the other tenſes exactly as they had ſtood connected with the primitive verb: this needs no example. 2d, They often collected the tenſes of verbs, whoſe preſent and imperfect were now obſolete, in order to ſupply this defect. Thus we have φερ-θιαω, ογχα, ηνεγκα. 3d, They often formed preſent and imperfect tenſes without any other tenſes annexed. The poets in particular ſeem to have fabricated theſe two tenſes at pleaſure.

If this procedure was convenient for the poets, it was certainly moſt incommodious with reſpect to the vulgar, as well as to foreigners who had an inclination to learn the language. The vulgar, ſome ages after Homer and Heſiod, muſt have found it as difficult to underſtand their poems as our people do to comprehend thoſe of Chaucer and Spenſer. By this diſpoſition, too, the etymology of verbs was almoſt entirely confounded. The preſent ſecond future being, as has been obſerved, the ancient preſent, the attention of the curious etymologiſt was naturally diverted to the modern preſent, where it was utterly impoſſible to diſcover the radical word. A few examples will elucidate this point: τεινω, *to ſtretch, to extend*, old preſent τανω; ταν is the radix, which at once appears to be a Perſian word ſignifying *a large tract of country*. Hence *Mauritania* "the land of the Mauri," Aquitania, Bretania; and with *s* prefixed Hindo-ſtan, Chuſi-ſtan, Turque-ſtan. The obſolete verb οπω, whence οπτομαι, is evidently derived from *op*, an Egyptian name of the moon: φαινω, ſecond future φανῶ, *to ſhow*, from the Egyptian word *phan* or *pan*, a name of the ſun: τυπτω, future ſecond τυπῶ: τυπ is obviouſly the offspring of תף *thaph*, "a drum or timbrel," from beating or ſtriking, &c. In ſuch etymological reſearches, the ſtudent muſt be careful to turn the Ionic η into the Doric α; becauſe the Dores were lateſt from the coaſt of Paleſtine, and conſequently retained the largeſt ſhare of the Phœnician dialect: thus γηθεω, *to rejoice*, turning η into α becomes γαθεω. This word, throwing away the termination, becomes *gath*, plainly ſignifying a *wine preſs* (v). It is likewiſe to be obſerved, that the Æolians often change α into υ, as συρξ inſtead of σαρξ, &c.

154 Greek infinitives uſed as nouns.

It is not our intention to enter into the arrangement and peculiar conſtructions of the Greek language. There is, however, one, which we cannot well paſs over in ſilence. As that tongue is deſtitute of thoſe words which the Latins call *gerunds*, to ſupply this defect they employ the infinitive with the article prefixed; thus, Εις το ειναι αυτυς φιλυς, *in order to their being friends*; απο τυ ἑλεσθαι αυτους Βασιλεα, *from their having elected a king*; Εκ τυ απο φευγειν αυτυς εκ της πολεως, *from their flying out of the city*. In theſe phraſes the infinitive is ſaid to aſſume the nature of a ſubſtantive noun; agreeing with the article before it, exactly as if it were a noun of the neuter gender. Idioms of this kind occur in our own tongue; only with us the verb, inſtead of being expreſſed in the infinitive, is turned into the participle. According to this arrangement, the firſt of the preceding phraſes, which, according to the Greek, would ſtand *toward to be friends*, in Engliſh is, *in order to their being friends*. This anomaly, then, if indeed it be ſuch, is of no matter of conſequence. The French, if we are not miſtaken, would expreſs it in the very ſame manner with the Greek, that is, *pour être amis*.

From treating of verbs, we ſhould naturally proceed

(v) Hence it came to ſignify rejoicing, from the mirth and revelry attending the treading of the vine preſs to the conſideration of adverbs, which are to denominated, becauſe they are generally the concomitants of verbs. Every thing relating to that part of ſpeech, in the Greek tongue, may be ſeen in the Port Royal or any other Greek grammar. Inſtead therefore of dwelling upon this beaten topic, we ſhall hazard a conjecture upon a point to which the critics in the Greek tongue, as far as we know, have not hitherto adverted.

155 Greek particles of oriental extraction. The moſt elegant and moſt admired writers of Greece, and eſpecially Homer, and after him Heſiod, abound with ſmall particles, which appear to us pure expletives, created as it were to promote harmony, or fill up a blank without ſenſe or ſignification. How thoſe expletive particles ſhould abound in that language beyond any other, we think, is a matter not eaſy to be accounted for. It has been ſaid by the Zoili, that if you extract theſe nonentities from the poems of that bard, *qui ſolus meruit dici poeta*, a *magnum inane*, a mighty blank, would be left behind. We would willingly do juſtice to that pigmy race of words, and at the ſame time vindicate the prince of poets from that groundleſs imputation. Plato likewiſe, the prince of philoſophers, has been often accuſed of too frequently employing theſe ſuperfluous auxiliaries.

Thoſe particles were no doubt imported from the eaſt. It would be ridiculous to imagine that any deſcription of men, however enthuſiaſtically fond they might be of harmonious numbers, would ſit down on purpoſe to fabricate that race of monoſyllables purely to eke out their verſes; mere ſounds without ſignificancy. In the firſt place, it may be obſerved, that there is a very ſtrict connection among the particles of all cognate languages. To this we may add, that the not underſtanding the nature, relations, ſignification, and original import of thoſe ſeemingly unimportant terms, has occaſioned not only great uncertainty, but numberleſs errors in tranſlating the ancient languages into the modern. The Greek language in particular loſes a conſiderable part of its beauty, elegance, variety, and energy, when theſe adverbial particles with which it is replete are not thoroughly comprehended. An exact tranſlation of theſe ſmall words, in appearance inſignificant, would throw new light not only on Homer and Heſiod, but even upon poets of a much poſterior date. Particles, which are generally treated as mere expletives, would often be found energetically ſignificant. It is, however, altogether impoſſible to ſucceed in this attempt without a competent ſkill in the Hebrew, Chaldaic, Arabian, Perſian, and old Gothic languages. We ſhall here take the liberty to mention a few of theſe particles which are moſt familiar, one or other of which occur in almoſt every line of Homer, and which we believe are either not underſtood or miſunderſtood. Such are Δα, δη, μεν, ηντοι, μαν, γε, ρι, αρα, ρα, γȣν. Δα is nothing elſe but the Chaldaic particle δα, the parent of the Engliſh *the*. It likewiſe ſignifies *by turns*, *in your turn*; δη is the ſame word in the Ionic dialect; μεν is a particle of the Hebrew affirmative אמן *amen*, *fides*, *veritas*. Μαν, a kind of oath by the moon, called *mana*, almoſt over all the eaſt; hence Dor. μανα; γε, an oath by γεα, that is, *the earth*; αρα, another oath by the ſame element, probably from the oriental word of the ſame import; ρα is a fragment of αρα mentioned before; γȣν, of γεα the *earth*, and ον or ων, an Egyptian name of the ſun; ως *as*, a particle which pervades all the dialects of the Gothic language. In this manner we believe all theſe ſmall words that occur ſo frequently in the Greek tongue, and which have hitherto been held inexplicable, may be eaſily rendered in ſignificant terms: and were this done, we believe they would add both beauty and energy to the clauſes in which they ſtand. But this diſcuſſion muſt be left to more accompliſhed adepts.

156 Prepoſitions. We ſhall not explain the nature of prepoſitions, becauſe we are convinced that few people will take the trouble to peruſe this diſquiſition who are not already acquainted with their import in language. The Greek prepoſitions are eighteen in number, which need not be enumerated here. Moſt of theſe might be eaſily ſhown to be particles, or fragments deduced from oriental or Gothic words. The uſe of theſe words is to connect together terms in diſcourſe, and to ſhow the relation between them. In languages where, as in Engliſh, all theſe relations are expreſſed without any change on the termination of the nouns to which they are prefixed, the proceſs is natural and eaſy. The whole is performed by juxtapoſition. But in the Greek and Latin tongues, this effect is produced, partly by prefixing prepoſitions and partly varying the terminations of nouns. Had the Greeks been able to intimate all thoſe relations by varying the terminations, or had they multiplied their prepoſitions to ſuch a number as would have enabled them to expreſs theſe relations without the caſual variations, as the northern languages have done; in either caſe their language would have been leſs embarraſſing than it is in its preſent ſtate. According to the preſent arrangement both prepoſitions and the caſual variations are uſed promiſcuouſly to anſwer that purpoſe; a method which appears to us not altogether uniform. Though this plan might occaſion little embarraſſment to natives, it muſt, in our opinion, have proved ſomewhat perplexing to foreigners. The difficulty would be, as to the latter, when to adopt the one and when the other expedient.

Another inconveniency ariſes from the exceeding ſmall number of prepoſitions in that language, which bear too ſmall a proportion to the great variety of relations which they are appropriated to expreſs. This deficiency obliged them often to employ the ſame prepoſition to denote different relations: For inſtance, **Επι** intimates, 1ſt, *upon*; as επι τȣ λιθȣ, *upon the ſtone*; and then it takes the genitive. 2d, It denotes *near upon*; as ἐπι τ ῳ λιθῳ, and then it governs the dative. 3d, The ſame prepoſition ſignifies *motion towards*; as **Επεσεν ἐπι τον λιθον**, *he fell upon the ſtone*. In theſe inſtances the ſame prepoſition intimates three different relations; and, which is ſtill more embarraſſing, each of theſe requires a different caſe. The difficulty in this inſtance is ſo conſiderable, that even the moſt accurate of the Greek writers themſelves often either forget or neglect the true application. Many examples of this might be adduced, did the limits aſſigned us admit ſuch illuſtrations. Every man who has carefully peruſed the Grecian authors will readily furniſh himſelf with examples.

157 irregularly uſed. Again, ſome prepoſitions, which indicate different relations, are prefixed to the ſame caſe. Thus, εξ ſignifies *from*; as, Εκ Διος αρχομεθα, *from Jupiter we begin*; ἀπ εμου βιου, *from my life*, or *my courſe of life*; προ των θυρων, *before the doors*; προ νικης εγκωμιον, *an encomium before the victory*; αντι αγαθων αποδιδοναι κακα, *to render*

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evil for good; αντι σου, *againſt you*. In theſe examples, and indeed every where, thoſe prepoſitions intimate different relations, and yet are prefixed to the ſame caſes. Sometimes the ſame prepoſition ſeems to aſſume two oppoſite ſignifications: this appears from the prepoſition αντι juſt mentioned, which intimates both *for*, *inſtead of*, and *againſt* or *oppoſite to*.

What has been obſerved with reſpect to the prepoſitions above mentioned, the reader will readily enough apply to κατα, μετα, δια, περι. Theſe incongruities certainly imply ſomething irregular; and ſeem to intimate that theſe anomalies were ſo deeply incorporated with the conſtitution of the language, that the ſubſequent improvers found it impoſſible to correct them. Indeed to prefix a prepoſition to a caſe already diſtinguiſhed by the affixed termination, appears to us a ſuperfluity at leaſt, if not an abſurdity; for certainly it would have been more natural to have ſaid εκ Ζευς αρχομεθα, than εκ Διος αρχομεθα. Some very learned men, who have inquired into *the origin of language*, have been of opinion that prepoſitions were the laſt invented ſpecies of words. If this opinion be well founded, we may ſuppoſe (and we think that this ſuppoſition is not altogether improbable) that the caſual terminations of the Greek language were firſt affixed to the radix, in the manner above exhibited; and that prepoſitions were afterwards fabricated and prefixed to the caſes already in uſe.

The ſyntax or conſtruction of the Greek language does not, according to our plan, come within the compaſs of our preſent inquiry. This the curious Greek ſtudent will eaſily acquire, by applying to the grammars compoſed for that purpoſe. We have already hazarded a few conjectures with reſpect to the formation of the moſt important and moſt diſtinguiſhed claſſes of words into which it has been divided by the moſt able grammarians, without, however, deſcending to the minutiæ of the language. As prepoſitions are the chief materials with which its other words, eſpecially verbs, are compounded, we ſhall briefly conſider the order in which they probably advanced in this proceſs.

158 [illegible] uſed in compoſition.

Complex ideas are compounded of a certain number or collection of ſimple ones. Of thoſe complex notions, ſome contain a greater and ſome a ſmaller number of ſimple conceptions. In language, then, there are two ways of expreſſing thoſe complex ideas, either by coining a word to expreſs every ſimple idea ſeparately, according to the order in which they ſtand in the mind; or by trying to combine two or more ſimple terms into one, and by that method to intimate one complex idea by one ſingle word. The Arabians, notwithſtanding all the boaſted excellencies of their language, have never arrived at the art of compounding their words, in order to anſwer this noble purpoſe; and the ſiſter dialects are but ſlenderly provided with this ſpecies of vocables. The Greeks, of all other nations (except perhaps thoſe who ſpake the Sanſcrit language), are unrivalled in the number, variety, propriety, elegance, energy, and expreſſion of their compound terms. The Greeks, like the Arabians, in the earlieſt ſtages of their language, had only a collection of radical disjointed words, conſiſting of the jargons of the aboriginal Greeks, of the Pelaſgi, Thracians, &c. How theſe words were arranged and conſtructed, we have no data remaining upon which we can found a critical inveſtigation. We muſt therefore remain ſatisfied with ſuch probable conjectures as the nature of the caſe, and the analogy of the language, ſeem to ſuggeſt.

The prepoſitions were originally placed before the nouns, whoſe relations they pointed out. For example, let us take the ξυναπεθνησκετο τοις αλλοις, *he died along with the reſt*, or *he* [illegible] *with the other*. Theſe words were arranged thus: απεθνησκο συν τοις αλλοις; and απο θνησκον συν τοις αλλοις. In this manner, the parts of every compound word were placed ſeparately, at leaſt as much as other words which had no connection.

159 The firſt compound words in Greek.

The firſt compound words of the Greek language were the radical nouns with the article, and the radical part of the ſubſtantive or auxiliary verb. The ſucceſs of this experiment encouraged them to attempt the ſame in other words. By this noble invention they found themſelves able to expreſs, in one word, with eaſe and ſignificancy, what in other languages, and formerly in their own, required a tedious ambages or circumlocution. In proceſs of time, as their language was gradually mellowed, they increaſed the number of their compounds, till their language, in that reſpect, infinitely excelled all its parent dialects. In this proceſs they were careful to unite ſuch letters as not only prevented aſperity and difficulty of pronunciation, but even promoted harmony and elegance. But this was the labour of poſterior ages.

The Greeks were entirely ignorant of the derivation or etymology of their language: for this we need only conſult Plato's Cratylus, Ariſtotle's Rhetoric, Demetrius Phalereus, Longinus, &c. In deducing patronymics, abſtracts, poſſeſſives, gentiles, diminutives, verbals, &c. from radicals of every kind, they have ſhown the greateſt art and dexterity. Examples of this occur almoſt in every page of every Greek author. But this extended no farther than their own language: every foreign language was an abomination to the Greeks. But more of this in the ſequel.

160 Original materials of the Greek language;

The original materials of the Greek tongue were undoubtedly rough and diſcordant, as we have deſcribed them above. They had been collected from different quarters, were the produce of different countries, and had been imported at very diſtant periods. It would therefore be an entertaining, if not an inſtructing, ſpeculation, if it were poſſible to diſcover by what men and by what means, this wonderful fabric was founded, erected, and carried to perfection. The writers of Greece afford us no light. Foreigners were unacquainted with that originally inſignificant canton. Every thing beyond Homer is buried in eternal oblivion. Orpheus is indeed reported to have compoſed poems; but theſe were ſoon obliterated by the hand of time. The verſes now aſcribed to that philoſophical hero are none of his *. Linus wrote, in the Pelaſgic dialect, the achievements of the firſt Bacchus; Thamyris the Thracian wrote; and Pronapides the maſter of Homer was a celebrated poet. The works of all theſe bards did not long ſurvive; and it is a certain fact that the Greek tongue was highly poliſhed even more early than the age in which theſe worthies flouriſhed. Homer, no doubt, imitated their productions, and ſome are of opinion that he borrowed liberally from them. The Greeks knew no more of the original character of their language, than of the original character and complexion of their progenitors. They allowed, indeed, that their language was originally barbarous and uncouth; but by what means or by what perſons it was poliſhed, enriched, and finally arranged, was to them an impenetrable ſecret.

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* [illegible] lib. 1. cap. 22.

We have already demonſtrated that the Ionim or aborigines of Greece were a race of barbarians; that conſequently their lauguage, or rather their jargon, was of the ſame contexture. The Pelaſgi found both the people and their ſpeech in this uncultivated ſtate. Theſe people arrived in Greece about the year before Chriſt 1760. It was then that the language of Greece began to be cultivated. Before the age of Homer the work ſeems to have been completed. Nothing of conſequence was afterwards added to the original ſtock; on the contrary, not a few moities were deducted from the Homeric treaſure. The Pelaſgi, as was ſaid before, arrived in Greece *an. ant. Chr.* 1760. Homer is thought to have been born *an. ant. Chr.* 1041; conſequently the cultivation of the Greek tongue was completed in a period of about 700 years. But upon the ſuppoſition that Orpheus, Linus, Thamyris, &c. wrote long before Homer, as they certainly did, that language had arrived nearly at the ſtandard of perfection two centuries before; by which computation the period of its progreſs towards its ſtationary point is reduced to 500 years. But as the Pelaſgi were a colony of foreigners, we ought to allow them one century at leaſt to ſettle and incorporate with the natives, and to communicate their language, laws, manners, and habits, to the aborigines of the country. By this deduction we ſhall reduce the term of cultivation to leſs than four centuries.

161 which was carried to its utmoſt perfection at a very early period

During this period Greece was furiouſly agitated by tumults and inſurrections. That country was divided into a number of independent ſtates, which were perpetually engaged in quarrels and competitions. The profeſſion of arms was abſolutely neceſſary for the protection and preſervation of the ſtate; and the man of conduct and prowefs was honoured as a demi-god, and his exploits tranſmitted with eclat to poſterity. The Greek tongue was then rough and unpoliſhed; becauſe, like the ancient Romans, the braveſt men were more diſpoſed to act than to ſpeak. Every language will take its colour from the temper and character of thoſe who employ it; and had it not been owing to one claſs of men, the Greek tongue would have continued equally rough to the era of Homer as it had been a century after the arrival of the Pelaſgi.

There has appeared among barbarous or half-civilized people a deſcription of men whoſe profeſſion it has been to frequent the houſes or palaces of the great, in order to celebrate their achievements, or thoſe of their anceſtors, in the ſublimeſt ſtrains of heroic poetry. Accordingly, we find that the Germans had their *bards*, the Gauls their *fads*, the Scandinavians their *ſcalds* or *ſcaldres*, the Iriſh their *fileas*, all retained for that very purpoſe. They lived with their chieftains or patrons; attended them to battle; were witneſſes of their heroic deeds; animated them with martial ſtrains; and celebrated their prowefs, if they proved victorious; or, if they fell, raiſed the ſong of woe, and chanted the mournful dirge over their ſepulchres. Theſe bards were always both poets and muſicians. Their perſons were held ſacred and inviolable. They attended public entertainments, and appeared in all national conventions. The chief of them were employed in the temples of the gods; and the leſs illuſtrious, like our minſtrels of old, ſtrolled about from place to place, and exerciſed their functions wherever they found employment.

162 by the poets, who made a

Among the ancient Greeks there was a numerous tribe of men of the very ſame deſcription, who were at once poets and muſicians, and whoſe office it was to celebrate the praiſes of the great, and to tranſmit their exploits to poſterity in the moſt exaggerated encomiums. Theſe poetical vagrants were ſtyled **Αοιδοι** or ſongſters. Some of theſe lived in the houſes of great men; while others, leſs ſkilful or leſs fortuuate, ſtrolled about the country in the manner above deſcribed. The more illuſtrious of theſe **Αοιδοι** who were retained in the temples of the gods, were certainly the firſt improvers of the language of the Greeks. Among the Hebrews we find the firſt poetical compoſitions were hymns in honour of Jehovah, and among the Pagans the ſame practice was eſtabliſhed. In Greece, when all was confuſion and devaſtation, the temples of the gods were held ſacred and inviolable. There the **Αοιδοι** improved their talents, and formed religious anthems on thoſe very models which their progenitors had chanted in the eaſt.

163 diſtinction between the language of gods and of men.

The language of the Greeks was yet rugged and unmellowed: their firſt care was to render it more ſoft and more flexible. They enriched it with vocables ſuited to the offices of religion; and theſe, we imagine, were chiefly imported from the eaſt. Homer every where mentions a diſtinction between the language of gods and men. The language of gods imports the oriental terms retained in the temples, and uſed in treating of the ceremonies of religion; the language of men intimates the ordinary civil dialect which ſprung from the mixed dialects of the country. The prieſts, no doubt, concurred in promoting this noble and important purpoſe. From this ſource the ſtrolling **Αοιδοι** drew the rudiments of their art; and from theſe laſt the vulgar deduced the elements of a poliſhed ſtyle.

To theſe **Αοιδοι** of the ſuperior order we would aſcribe thoſe changes mentioned in the preceding part of this inquiry, by which the Greek tongue acquired that variety and flexibility, from which two qualities it has derived a great ſhare of that eaſe, beauty, and verſatility, by which it now ſurpaſſes moſt other languages. The diverſity of its terminations furniſhes a moſt charming variety, while at the ſame time the ſenſe is communicated to the reader or hearer by the relation between them. By this economy the poet and orator are left at liberty to arrange their vocables in that order which may be moſt ſoothing to the ear, and beſt adapted to make a laſting impreſſion on the mind.

Few colonies have emigrated from any civilized country without a detachment of prieſts in their train. The ſupreme powers, whoever they were, have always been worſhipped with muſic and dancing. The Hebrews, Phœnicians, and Egyptians, delighted in theſe muſical and jocund feſtivals. The prieſts who attended the Iones, Dores, Æolians, Thebans, Athenians, &c. from the eaſt, introduced into Greece that exquiſite taſte, thoſe delicate muſical feelings, which diſtinguiſhed the Greeks from all the neighbouring nations. Hence that numerous race of onomatapœas, by which the Greek language is inveſted with the power of expreſſing almoſt every paſſion of the human ſoul, in ſuch terms as oblige it to feel and actually

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to aſſimilate to the paſſion it would excite. Numberleſs inſtances of this occur in every page of Homer, Heſiod, Pindar, Sophocles, Euripides, and even of Ariſtophanes: to quote inſtances would be to inſult the Greek ſtudent.

Every body knows that the practice of writing in verſe was antecedent to the date of proſaic compoſition. Here, then, the Ἀοιδοὶ and the miniſters of religion chiefly diſplayed their ſkill and diſcernment. By a judicious mixture of ſhort and long ſyllables; by a junction of conſonants which naturally ſlide into each other; by a careful attention to the rhythm, or harmony reſulting from the combination of the ſyllables of the whole line—they completed the metrical tone of the verſe, guided by that delicacy of muſical feeling of which they were poſſeſſed before rules of proſody were known among men.

Much liberty was certainly uſed in tranſpoſing letters, in varying terminations, in annexing prefixes and affixes, both to nouns and other kinds of words where ſuch adjuncts were poſſible: and upon this occaſion we think it probable, that thoſe particles of which we have ſpoken above were inſerted like filling ſtones thruſt in to ſtop the gaps or chinks of a building. Verſes were then clumſy and irregular, as the quantity of vowels was not duly aſcertained, and the colliſion of heterogeneous conſonants not always avoided. Probably theſe primitive verſes differed as widely from the finiſhed ſtrains of Homer and his ſucceſſors, as thoſe of Chaucer and Spencer do from the ſmooth poliſhed lines of Dryden and Pope.

164 Earlieſt poets of Greece.

The poetical compoſitions of the earlieſt Greeks were not, we think, in the hexameter ſtyle. As they were chiefly calculated for religious ſervices, we imagine they reſembled the Hebrew iambics preſerved in the ſong of Aaron and Miriam, Deborah and Barak, Pſalms, Proverbs, &c. which were indeed calculated for the ſame purpoſe. Archilochus perhaps imitated theſe, though the model upon which he formed his iambics was not generally known. The later dramatic poets ſeem to have copied from the ſame archetypes. Hexameters, it is probable, were invented by Orpheus, Linus, Thamyris, Muſæus, &c. The firſt of theſe travelled into Egypt, where he might learn the hexameter meaſure from that people, who uſed to bewail *Maneros* and *Oſiris* in elegiac ſtrains. This ſpecies of metre was firſt conſecrated to theology, and the moſt profound ſciences of moral and natural philoſophy; at length it was brought down to celebrate the exploits of kings and heroes.

Res geſtas regumque, ducumque, et triſtia bella,
Quo ſcribi poſſent numero monſtravit Homerus.

We have hazarded a conjecture above, importing that the earlieſt poetical compoſitions of the Greeks were conſecrated to the ſervice of the gods. We ſhall now produce a few facts, which will furniſh at leaſt a preſumptive evidence of the probability of that conjecture.

165 Orpheus.

Orpheus begins his poem with ancient chaos, its transformations and changes, and purſues it through its various revolutions. He then goes on to deſcribe the offſpring of Saturn, that is time, the æther, love, and light. In ſhort, his whole poem is, ſaid to have been an oriental allegory, calculated to inſpire mankind with the fear of the gods, and to deter them from murder, rapine, unnatural luſts, &c.

166 Muſæus.

Muſæus was the favourite ſcholar of Orpheus, or perhaps his ſon. He compoſed propheſies and hymns, and wrote ſacred inſtructions, which he addreſſed to his ſon. He preſcribed atonements and luſtrations; but his great work was a Theogony, or Hiſtory of the Creation, &c.

167 Melampus.

Melampus brought the myſteries of Proſerpine from Egypt into Greece. He wrote the whole hiſtory of the diſaſters of the gods. This poet is mentioned by Homer himſelf.

168 Olen.

Olen came from Lycia, and compoſed the firſt hymn that was ſung in Delos at their ſolemnities; he probably emigrated from Patara a city of Lycia, where Apollo had a celebrated temple and oracle.

The Hyperborean damſels uſed to viſit Delos, where they chanted ſacred hymns in honour of the Delian god.

169 Homer and Heſiod.

To theſe we add the great Homer himſelf, if indeed the hymns commonly annexed to the Odyſſey are his compoſition. Heſiod's Theogony is too well known to need to be mentioned.

From theſe inſtances we hope it appears, that the origin of the poetry of Greece is to be found in the temples; and that there, its meaſure, numbers, rhythm, and other appendages, were originally fabricated.

170 Different dialects, with their origin.

The Grecian poets, however, enjoyed another advantage which that claſs of writers have ſeldom poſſeſſed, which aroſe from the different dialects into which their language was divided. All thoſe dialects were adopted indifferently by the prince of poets; a circumſtance which enabled him to take advantage of any word from any dialect, provided it ſuited his purpoſe. This, at the ſame time that it rendered verſification eaſy, diffuſed an agreeable variety over his compoſition. He even accommodated words from Macedonia, Epirus, and Illyricum, to the purpoſes of his verſification: Beſides, the laws of quantity were not then clearly aſcertained; a circumſtance which afforded him another conveniency. Succeeding poets did not enjoy theſe advantages, and conſequently have been more circumſcribed both in their diction and numbers.

The Greek language, as is generally known, was divided into many different dialects. Every ſept, or petty canton, had ſome peculiar forms of ſpeech which diſtinguiſhed it from the others. There were, however, four different dialectical variations which carried it over all the others. Theſe were the Attic, Ionic, Æolic, and Doric. Theſe four dialectical diſtinctions originated from the different countries in the eaſt from which the tribes reſpectively emigrated. The Attics conſiſted, 1ſt, of the barbarous aborigines; 2d, of an adventitious colony of Egyptian Saites; 3d, a branch of Ionians from the coaſt of Paleſtine. Theſe laſt formed the old Ionian dialect, from which ſprung the Attic and modern Ionic. The Æolians emigrated from a different quarter of the ſame coaſt; the inhabitants of which were a remnant of the old Canaanites, and conſequently different in dialect from the two firſt mentioned colonies. The Dores ſprang from an unpoliſhed race of purple fiſhers on the ſame coaſt, and conſequently ſpoke a dialect more coarſe and ruſtic than any of the reſt. Theſe four nations emigrated from different regions; a circumſtance which, in our opinion, laid the foundation of the different dialects by which they were afterwards diſtinguiſhed.

It is impoſſible in this ſhort ſketch to exhibit an exact view of the diſtinguiſhing features of each dialect. Such an analyſis would carry us far beyond the limits of the article in queſtion. For entire ſatisfaction on this head, we muſt refer the Grecian ſtudent to Mattaire's *Græcæ Linguæ Dialecti*, where he will find every thing neceſſary to qualify him for underſtanding that ſubject. We ſhall content ourſelves with the few obſervations following.

The Athenians being an active, briſk, volatile race, delighted in contractions. Their ſtyle was moſt exquiſitely poliſhed. The moſt celebrated authors who wrote in that dialect were the following: Plato, Thucydides, Xenophon, Demoſthenes, and the other orators; Æſchylus, Euripides, Sophocles, Ariſtophanes, Menander, Diphilus, with the other comic and tragic poets. That dialect was either ancient or modern. The ancient Attic was the ſame with the Ionic.

The Ionic, as was ſaid, was the ancient Attic; but when that nation emigrated from Attica and ſettled on the coaſt of Aſia Minor, they mingled with the Carians and Pelaſgi, and of courſe adopted a number of their vocables. They were an indolent, luxurious, and diſſolute people; of courſe their ſtyle was indeed eaſy and flowing, but verboſe, redundant, and without nerves. This, however, is the leading ſtyle in Homer; and after him a prodigious number of writers on every ſubject have uſed the ſame dialect, ſuch as Herodotus of Halicarnaſſus the celebrated hiſtorian; Cteſias of Cnidus the hiſtorian of Perſia and India; Hecatæus of Miletus; Megaſthenes the hiſtorian, who lived under Seleucus Nicator; Hippocrates the celebrated phyſician of Coos; Hellanicus the hiſtorian often mentioned with honour by Polybius; Anacreon of Teia, Alcæus, Sappho of Leſbos, excellent poets; Pherecydes Syrus the philoſopher, and a multitude of other perſons of the ſame profeſſion, whom it would be ſuperfluous to mention upon the preſent occaſion.

The Æolic and Doric were originally cognate dialects. When the Dorians invaded Peloponneſus and ſettled in that peninſula, they incorporated with the Æolians, and their two dialects blended into one produced the new Doric. The original Dores inhabited a rugged mountainous region about Oſſa and Pindus, and ſpoke a rough unpoliſhed language ſimilar to the ſoil which they inhabited. Andreas Schottus, in his obſervations on poetry, lib. ii. cap. 50. proves from an old manuſcript of "Theocritus, that there were two dialects of the Doric tongue, the one ancient and the other modern; that this poet employed Ionic and the modern Doric; that the old Doric dialect was rough and cumbrous; but that Theocritus has adopted the new as being more ſoft and mellow." A prodigious number of poets and philoſophers wrote in this dialect, ſuch as Epicharmus the poet; Ibycus the poet of Rhegium; Corinna the poeteſs of Theſpis, or Thebes, or Corinth, who bore away the prize of poetry from Pindar; Erynna a poeteſs of Leſbos; Moſchus the poet of Syracuſe; Sappho the poeteſs of Mitylene; Pindarus of Thebes, the prince of lyric poets; Archimedes of Syracuſe, the renowned mathematician; and almoſt all the Pythagorean philoſophers. Few hiſtorians wrote in that dialect; or if they did, their works have not fallen into our hands. Moſt of the hymns ſung in temples of the gods were compoſed in Doric; a circumſtance which evinces the antiquity of that dialect, and which, at the ſame time, proves its affinity to the oriental ſtandard.

171
The partiality of the Greeks to their own tongue, and its evil conſequences.

After that the Greek tongue was thoroughly poliſhed by the ſteps which we have endeavoured to trace in the preceding pages, conſcious of the ſuperior excellency of their own language, the Greeks, in the pride of their heart, ſtigmatized every nation which did not employ their language with the contemptuous title of *barbarians*. Such was the delicacy of their pampered ears, that they could not endure the untutored voice of the people whom they called Βαρβαροφωνοι. This extreme delicacy produced three very pernicious effects; for, 1ſt, It induced them to metamorphoſe and ſometimes even to mangle, foreign names, in order to reduce their ſound to the Grecian ſtandard; and, 2d, It prevented their learning the languages of the eaſt, the knowledge of which would have opened to them an avenue to the records, annals, antiquities, laws, cuſtoms, &c. of the people of thoſe countries, in compariſon of whom the Greeks themſelves were of yeſterday, and knew nothing. By this unlucky bias, not only they, but even we who derive all the little knowledge of antiquity we poſſeſs through the channel of their writings, have ſuffered an irreparable injury. By their transformation of oriental names they have in a manner ſtopped the channel of communication between the hiſtories of Europe and Aſia. This appears evident from the fragments of Cteſias's Perſian hiſtory, from Herodotus, Xenophon, and all the other Grecian writers who have occaſion to mention the intercourſe between the Greeks and Perſians. 3d, It deprived them of all knowledge of the etymology of their own language, without which it was impoſſible for them to underſtand its words, phraſeology, and idioms, to the bottom. We mentioned Plato's Cratylus above. In that dialogue, the divine philoſopher endeavours to inveſtigate the etymology of only a few Greek words. His deductions are abſolutely childiſh, and little ſuperior to the random conjectures of a ſchool-boy. Varro, the moſt learned of all the Romans, has not been more ſucceſsful. Both ſtumbled on the very threſhold of that uſeful ſcience; and a ſcholar of very moderate proficiency in our days knows more of the origin of theſe two noble languages, than the greateſt adepts among the natives did in theirs. By prefixes, affixes, tranſpoſitions of letters, new conjunctions of vowels and conſonants for the ſake of the muſic and rhythm, they have ſo diſguiſed their words, that it is almoſt impoſſible to develope their original. As a proof of this, we remember to have ſeen a manuſcript in the hands of a private perſon where the firſt twelve verſes of the Iliad are carefully analyſed; and it appears to our ſatisfaction that almoſt every word may be, and actually is, traced back to a Hebrew, Phœnician, Chaldean, or Ægyptian original: And we are convinced that the ſame proceſs will hold good in the like number of verſes taken from any of the moſt celebrated poets of Greece. This inveſtigation we found was chiefly conducted by reducing the words to their original invariable ſtate, which was done by ſtripping them of prefixes, affixes, &c. Theſe ſtrictures are, we think, well founded; and conſequently need no apology to protect them.

172
Beauty of the Greek language.

Theſe imperfections, however, are counterbalanced by numberleſs excellencies: and we are certainly much more indebted to that incomparable people for the information they have tranſmitted to us through the medium of their writings, than injured by them in not conveying to us and to themſelves more authentic and more ample communications of ancient events and occurrences. Without fatiguing our readers with ſuperfluous encomiums on a language which has long ago been extolled perhaps

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to an extravagant degree by the labours of men of the moſt enlarged capacity and the moſt refined taſte, we ſhall now proceed to make a few obſervations on *ſpirits* and *accents*; which being rather appendages than eſſentials of the language, we have on purpoſe reſerved for the laſt place.

173 The ſpiritus aſper and lenis.

Every word in the Greek language beginning with a vowel is marked with a ſpirit or breathing: This aſpiration is double, namely *lenis et aſper*, "the gentle, and rough or aſpirated." The gentle accent, though always marked, is not now pronounced, though in the earlieſt periods of the language it was undoubtedly enounced, though very ſoftly. Both theſe aſpirations were imported from the eaſt. They were actually the Hebrew ה *he* and ח *heth*. The former denoted the *ſpiritus lenis*, and the latter the *ſpiritus aſper*. The Hebrew prefixed *ha* or *he* to words beginning with a vowel, and of courſe the Greeks followed their example. Theſe people ſeem to have delighted in aſpirates; and of conſequence the letter ς is, ſome think, rather too often affixed to the terminations of their words. Every word beginning with ρ had the aſpirate joined to ρ, probably with a deſign to render the aſpiration ſtill more rough.

174 The accents.

The Greek accents are three in number; the acute, the grave, and the circumflex. The acute raiſes and ſharpens the voice; the grave depreſſes and flattens it; the circumflex firſt raiſes and ſharpens the voice, and then depreſſes and flattens it. It is obviouſly compoſed of the other two. The learned author of the *Origin and Progreſs of Language* has taken much pains to prove that theſe accents were actually muſical notes, invented and accommodated to raiſe, depreſs, and ſuſpend the voice, according to a ſcale of muſical proportions. It is ſcarce poſſible, we think, for a modern Greek ſcholar to comprehend diſtinctly the ancient theory of accents. Theſe the native Greeks learned from their infancy, and that with ſuch accuracy, that even the vulgar among the Athenians would have hiſſed an actor or actreſs off the ſtage or an orator off the pulpitum*, on account of a few miſtakes in the enunciation of thoſe notes.

The elevations, depreſſions, and ſuſpenſions of the voice upon certain ſyllables, muſt have made their language ſound in the ears of foreigners ſomewhat like recitative, or ſomething nearly reſembling *cant*. But the little variety of thoſe ſyllabic tones, and the voice not reſting upon them, but running them on without interruption, ſufficiently diſtinguiſhed them from muſic or cant. Be that as it may, we think it highly probable, that the wonderful effects produced by the harangues of the orators of Greece on the enraptured minds of their hearers, were owing in a good meaſure to thoſe artificial muſical tones by which their ſyllables were ſo happily diverſified.

To this purpoſe we ſhall take the liberty to tranſcribe a paſſage from Dion. Halic. *De Structura Orationis*, which we find tranſlated by the author of the *Origin and Progreſs of Language*, vol. ii. book 3d, part ii. chap. 7. page 381. "Rhetorical compoſition is a kind of muſic, differing only from ſong or inſtrumental muſic, in the degree, not in the kind; for in this compoſition the words have melody, rythm, variety, or change, and what is proper or becoming: So that the ear in it, as well as in muſic, is delighted with the melody, moved by the rythm, is fond of variety, and deſires with all theſe what is proper and ſuitable. The difference, therefore, is only of greater and leſs."

With reſpect to accents, it may be obſerved that only one ſyllable of a word is capable of receiving the acute accent, however many there be in the word. It was thought that the raiſing the tone upon more than one ſyllable of the word, would have made the pronunciation too various and complicated, and too like chanting.

The *grave accent* always takes place when the acute is wanting. It accords with the level of the diſcourſe; whereas the acute raiſes the voice above it.

The *circumflex accent* being compoſed of the other two is always placed over a long ſyllable, becauſe it is impoſſible firſt to elevate the voice and then to depreſs it on a ſhort one. Indeed among the Greeks a long ſyllable was pronounced like two ſhort ones; and we apprehend it was ſometimes written ſo, eſpecially in later times. It is altogether obvious from two learned Greek authors, Dion. Halic. and Ariſtoxenus, that the Greek accents were actually muſical notes, and that theſe tones did not conſiſt of loud and low, or ſimply elevating and depreſſing the voice; but that they were uttered in ſuch a manner as to produce a melodious rythm in diſcourſe.

In a word, the acute accent might be placed upon any ſyllable before the antepenult, and roſe to a *fifth* in the diatonical ſcale of muſic; the grave fell to the third below it. The circumflex was regulated according to the meaſure of both, the acute always preceding. The grave accent is never marked except over the laſt ſyllable. When no accent is marked, there the grave always takes place. Some words are called *enclitics*. Theſe have no accent expreſſed, but throw it back upon the preceding word. The circumflex, when the laſt ſyllable is ſhort, is often found over the penult, but never over any other ſyllable but the laſt or the laſt but one.

175 The ancient Greeks had no accentual marks.

The ancient Greeks had no accentual marks. They learned thoſe modifications of voice by practice from their infancy; and we are aſſured by good authority, that in pronunciation they obſerve them to this day. The accentual marks are ſaid to have been invented by a famous grammarian, Ariſtophanes of Byzantium, keeper of the Alexandrian library under Ptolemy Philopater, and Epiphanes, who was the firſt likewiſe who is ſuppoſed to have invented punctuation. Accentual marks, however, were not in common uſe till about the ſeventh century; at which time they are found in manuſcripts. If our curious readers would wiſh to enter more deeply into the theory of accents, we muſt remit them to Origin of Language, vol. ii. lib. 2. *paſſim*; and to Mr Foſter's Eſſay on the different Nature of Accent and Quantity.

Such, in general, are the obſervations which we thought the nature of our deſign obliged us to make on the origin and progreſs of the Greek language. Some of our more learned readers may perhaps blame us for not interſperſing the whole diſquiſition with quotations from the moſt celebrated writers in the language which has been the object of our reſearches. We are well aware that this is the general practice in ſuch caſes. The books were before us, and we might have tranſcribed from them more quotations than the nature of an article of this kind would permit. In the firſt part there were no books on

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* See *Pulpitum*.

Greek Language.

that language to quote from, becauſe the Greeks knew nothing of their own origin, nor of that of their language, and conſequently have recorded nothing but dreams and fictions relating to that ſubject. Even when we had made conſiderable progreſs in our inquiry, the nature of the plan we have adopted excluded in a great meaſure the uſe of quotations. When we drew near the concluſion, we imagined that our learned readers would naturally have recourſe to the paſſages alluded to without our information, and that the unlearned would not trouble themſelves about the matter. The Greek ſtudent who intends to penetrate into the depths of this excellent language, wll endeavour to be thoroughly acquainted with the books after mentioned.

176 Books to be ſtudied by every one who wiſhes to be a maſter of this language.

Ariſtotle's Rhetoric and Poetics, his book *De Interpretatione*, eſpecially with Ammonius's Commentary. Ammonius was a native of Alexandria, and by far the moſt acute of all the ancient grammarians.

Dion. Halic. *De Structura Orationis*, where, amidſt abundance of curious and intereſting obſervations, will be found the true pronunciation of the Greek letters.

Demetrius Phalereus *De Elocutione*; a ſhort eſſay indeed, but replete with inſtruction concerning the proper arrangement of words and members in ſentences.

Longinus, the prince of critics, whoſe remains are above commendation. Theodorus Gaza ‡ and the other refugees from Conſtantinople, who found an hoſpitable reception from the munificent family of the Medici, and whoſe learned labours in their native language once more revived learning and good taſte in Europe. Theſe, with ſome other critics of leſs celebrity, but equal utility, will unlock all the treaſures of Grecian erudition, without however diſcloſing the ſource from which they flowed. To theſe one might add a few celebrated moderns, ſuch as Monſ. Fourmont the Elder, Monſ. Gebelin, Abbé Pezron, Salmaſius, and eſpecially the learned and induſtrious Lord Monboddo.

‡ See *Gaza*

We ſhall now give a very brief account of the vaſt extent of the Greek language even before the Macedonian empire was erected; at which period, indeed, it became in a manner univerſal, much more than ever the Latin language could accompliſh notwithſtanding the vaſt extent of the Roman empire.

177 Vaſt extent of the Greek language.

Greece, originally Hellas, was a region of ſmall extent, and yet ſent out many numerous colonies into different parts of the world. Theſe colonies carried their native language along with them, and induſtriouſly diffuſed it wherever they formed a ſettlement. The Iones, Æoles, and Dores, poſſeſſed themſelves of all the weſt and north-weſt coaſt of the Leſſer Aſia and the adjacent iſlands; and there even the barbarians learned that poliſhed language. The Greek colonies extended themſelves along the ſouth coaſt of the Euxine ſea as far as Sinope, now Trebizund, and all the way from the weſt coaſt of Aſia Minor: though many cities of barbarians lay between, the Greek tongue was underſtood and generally ſpoken by people of rank and faſhion.

There were Greek cities on the north coaſt of the Euxine ſea to the very eaſtern point, and perhaps beyond even thoſe limits; likewiſe in the Taurica Cherſoneſus, or Crim Tartary; and even to the mouth of the Danube, the ſtraits of Caffa, &c. In the neighbourhood of all theſe colonies, the Greek language was carefully propagated among the barbarians, who carried on commerce with the Greeks.

A great part of the ſouth of Italy was planted with Greek cities on both coaſts; ſo that the country was denominated *Magna Græcia*. Here the Greek tongue univerſally prevailed. In Sicily it was in a manner vernacular. The Ionians had ſent a colony into Egypt in the reign of Pſammitichus; and a Greek ſettlement had been formed in Cyrenia many ages before. The Phocians had built Maſſilia or Marſeilles as early as the reign of Cyrus the Great, where ſome remains of the Greek language are ſtill to be diſcovered. Cæſar tells us, that in the camp of the Helvetii regiſters were found in Greek letters. Perhaps no language ever had ſo extenſive a ſpread, where it was not propagated by the law of conqueſt.

178 Greek ſpoken at preſent.

The Greek tongue, at this day, is confined within very narrow limits. It is ſpoken in Greece itſelf, except in Epirus, and the weſtern parts of Macedonia. It is likewiſe ſpoken in the Grecian and Aſiatic iſlands, in Candia or Crete, in ſome parts of the coaſt of Aſia Minor, and in Cyprus: but in all theſe regions, it is much corrupted and degenerated.

As a ſpecimen, we ſhall inſert a modern Greek ſong, and the advertiſement of a quack medicine, which with other plunder, was brought by the Ruſſians from Chocſim or Chotzim in 1772.

Song in modern Greek.

ΜΙ δυσικίαις πολεμῶ μι βάσανα ὡς τὸ λεμό
 Ειμαι, και κεντινεύω, και νὰ χαθω κοντεύω
Στο πέλαγος των συμφερῶν με ἐπικινδυνον καιρὸν
 Μ᾽ ανέμȣς ὀλάθρȣς σφοδρȣς και εναντιȣς.
Με κύματα πολλῶν και μῶν τȣφανι αναςεναςμῶν.
 Θαλασσα φȣσκομένη, πόλλα ἀγριομένη,
῞Οπȣ̃ ἀφριζι και φησὰ γε σκαγανάκια περιςσά
 Σύνεφα σκοτισμενα και κατασυγχισμένα,
Και νὰ φανῆ μιὰ σωτηρία, νὰ ἰδȣν τά ματιά μȣςεριά.
 Γλιγα νερα να εὕρω, κάσχα και δεν ηξεύρω̃,
Ν᾽ ἀράξω και δεν ἠμπορῶ γιατι λιμένα δεν θορῶ.
 Μ᾽ ατ λπισίαν θρέχω οτα ἄρμενα πȣ̃ ἔχω.
Πȣ̃ μὲ αὐτὰ κὰν νὰ πνυγῶ ἢ σελαμέτινα εὑγῶ,
 Καὶ τȣτα ἄν βαςαξȣν, ἐμπορȣν νὰ μὲ φυλαξȣν.

Tranſlation.

With dire misfortunes, pains, and woes,
O'erwhelm'd, ingulph'd, I ſtruggling fight;
 O'er my frail bark proud billows cloſe,
To plunge her deep in laſting night.
 Rough ſeas of ills inceſſant roar,
Fierce winds adverſe, with howling blaſt,
 Heave ſurge on ſurge. Ah! far from ſhore
My found'ring ſkiff ſhall ſink at laſt.
 Involv'd in low'ring darkſome clouds,
'Mid ſultry fogs, I pant for breath;
 Huge foaming billows rend my ſhrouds,
While yawning gulfs extend beneath.
 From burſting clouds loud thunders roll,
And deaf'ning peals terrific ſpread;
 Red lightnings dart from pole to pole,
And burſt o'er my devoted head.
 When ſhall the friendly dawning rays
Guide me to pleaſures once poſſeſt;
 And breezy gales, o'er peaceful ſeas,
Waft to ſome port of endleſs reſt?

Greek Language.

In dark despair, with tempests toss'd,
I veer my sail from side to side.
Conduct me, Heav'n! to yond' fair coast,
Or plunge me in the 'whelming tide.

The Quack Bill.

ΒΑΛΣΑΜΟΝ ΤΗΣ ἹΕΡΟΥΣΑΛΗΜ, ΑΠΟ
ΤΑΙΣ, ΚΑΙ ΝΟΥΡΙΑΙΣ, ΚΑΙ
ΠΑΛΑΙΣ ΡΕΤΖΕΤΑΙΣ.

ΤΟΥΤΟ *τὸ μπαλσάμον ἀφέλει εἰς τὸ ἀδυνατὸν σομάχι, καὶ βοηθεῖ τὴν χώνευσιν δυναμώνει τὴν καρδίαν. συγκόπτει ὅλας τὰς ἰσοδεξάσεις τῆς κοιλίας ὠφέλει εἰς τὸ στῆθος καὶ ἄγχα παλαιόν. Ἰατρεύει τὰς ἐσωτερικὰς πληγὰς τὸ στῆθος, καὶ τὸ πνεύμονας ἤγουν πλεμόνας. καὶ τὰ καταμήνια τῶν γυναικῶν. Εἰς τὰς ἐξωτερικὰς πληγὰς πρέπει νὰ βάζεται μὲ τὸ ξανθὸ τεσον εἰς πλάκας. Ὅσον καὶ κοψίματα, καὶ ὀπαὶ εἶναι ἡ σπαθιαῖς, καὶ μαχαιριαῖς, καὶ ἄλλα κοψίματα ἰατρεύει καθολογῆς Φισελα, καὶ ὅλας τὰς βρωμερὰς πληγὰς ὁπȣ ἰσδεχταν ἐς τὸ κοκκλον θαυμαστῶς, ἀφέλει εἰς τὰ αὐτία ὁπȣ τρέχουν ἔμπυον νὰ σταζεται δυο ἢ τρεῖς κόμπας ἤγουν σταλαγματίας μὲ βαμπάκι βρεμμένον εἰς αὐτό. βάνεται εἰς τὰς πληγωμένας δοντοκοιλιαῖς καὶ θέλειν ἰατρευθῇ. καὶ ἀκόμι δυναμώνει τὰ δόντια ὁπȣ κινοῦν καὶ δὲ θέλουν νὰ πέσουν. βοηθεῖ καὶ ἀπὸ τὴν πανοῦκλαν.*

Ἡ δόσις ἐσωτερικῶς ἂς εἶναι δέκα ἢ καὶ δώδεκα κόμπας εἰς ὀλίγον κρασί, ἢ καὶ νερὸν τὸ καθὲ ταχὺ καὶ βραδύ. ἂς τὸ μεταχειρίζεται, καὶ εἶναι θαυμάσιον μὲ τὴν δοκιμὴν βεβαιωμένον.

Ἀληθὲς βάλσαμον τȣ Βασιλέως.

Instead of giving a literal and bald translation of this advertisement, which runs exactly in the style of other quack bills, it may be sufficient to observe, that the medicine recommended is said, when taken inwardly, to raise the spirits, remove costiveness and inveterate coughs; to cure pains of the breast and bellyaches; to to aſſiſt reſpiration, and remove certain female obſtructions. When applied externally, it cures wounds and ſores, whether old or freſh, removes ringing of the ears, faſtens the teeth when looſe, and ſtrengthens the gums.

All this, and much more, it is ſaid to do in a wonderful manner; and is declared to be the true royal balſam of Jeruſalem, and an univerſal ſpecific.

It is indeed next to a miracle that ſo many monuments of Grecian literature are ſtill to be found among men. Notwithſtanding the burning of the famous library of Alexandria, and the almoſt numberleſs wars, maſſacres, and devaſtations, which have from time to time in a manner deſolated thoſe countries where the Greek language once flouriſhed; we are told that there ſtill remain about 3000 books written in that language.

159 Diſtinguiſhed ſtages of the Greek language.

We ſhall now conclude this ſection with a brief detail of the moſt diſtinguiſhed ſtages and variations through which this noble tongue made its progreſs from the age of Homer to the taking of Conſtantinople, *an. ant. Chr.* 1453; a period of more than 2000 years.

Homer gave the Greek poetry its colour and conſiſtency, and enriched, as well as harmonized, the language. It ſeems, from the coincidence of epithets and cadence in Homer and Heſiod, that the Greek heroic verſe was formed ſpontaneouſly, by the old Αοιδοι, a ſort of *improviſatori*; and that Homer and his firſt followers adopted their verſification. The Iliad and Odyſſey have much of the air of extempore compoſition; an epithet is never wanting to fill up a verſe, and a ſet of expreſſions are mechanically annexed to ſuch ideas as were of frequent recurrence. Hence that copiouſneſs, and waſte of words in the old Greek bard, which forms ſuch a contraſt to the condenſed and laboured compoſition of Virgil.

The Greek proſe was of a more difficult ſtructure; and it may be diſtributed into different ſtyles or degrees of purity. Of the proſe-authors now extant, the firſt and beſt ſtyle is that of Herodotus, and of Plato in the florid or mixed kind, of Xenophon in the pure and ſimple, of Thucydides and Demoſthenes in the auſtere. Nothing, perhaps, is ſo conducive to form a good taſte in compoſition as the ſtudy of theſe writers.

The ſtyle of Polybius forms a new epoch in the hiſtory of the Greek language: it was the idiotic or popular manner of expreſſion, eſpecially among military men, in his time, about the 150th Olympiad. It became the model of ſucceeding writers, by introducing a ſimple unſtudied expreſſion, and by emancipating them from the anxious labour of the old Greeks reſpecting the cadence and choice of words. The ſtyle of the New Teſtament, being plain and popular, frequently reſembles that of Polybius, as has been ſhown by Raphelius, and by Kirchmaier, *de paralleliſmo* N. T. *et Polybii*, 1725.

Before this hiſtorian, the Alexandrian Jews had formed a new or Helleniſtic ſtyle, reſulting from the expreſſion of oriental ideas and idioms in Greek words, after that language had loſt of its purity, as it gained in general uſe, by the conqueſts of Alexander. The Helleniſtic is the language of the Septuagint, the Apocrypha, the New Teſtament, and partly of Philo and Joſephus. This mixture in the ſtyle of the evangeliſts and apoſtles, is one credential of the authenticity of the beſt of all books, a book which could not have been written but by Jewiſh authors in the firſt century. See the fine remarks of Biſhop Warburton, Doctrine of Grace, book i. ch. 8—10. Critics loſe their labour in attempting to adjuſt the Scripture-Greek to the ſtandard of Atticiſm.

The diction of the Greek hiſtorians, and geographers of the Auguſtan age, is formed on that of Polybius; but improved and modernized, like the Engliſh of the preſent age, if compared with that of Clarendon or Bacon. More perſpicuous than refined, it was well ſuited to ſuch compilations as were then written by men of letters, ſuch as Dionyſius, Diodorus, and Strabo, without much experience or rank in public life.

The eccleſiaſtical ſtyle was cultivated in the Chriſtian ſchools of Alexandria, Antioch, and Conſtantinople; rank and luxuriant, full of oriental idioms, and formed in a great meaſure on the Septuagint verſion. Such is, for inſtance, the ſtyle of Euſebius. After him, the beſt Chriſtian writers poliſhed their compoſitions in the ſchools of rhetoric under the later ſophiſts. Hence the popular and flowing purity of St Chryſoſtome, who has more good ſenſe than Plato, and perhaps as many good words.

On the Greek of the Byzantine empire, there is a good diſſertation by Ducange, *de cauſis corruptæ Græcitatis*, prefixed to his Gloſſary, together with Portius's Grammar of the modern Greek. This laſt ſtage of the Greek language is a miſerable picture of Turkiſh barbariſm. And, which is moſt ſurpriſing, there is no city of Greece where the language is more different from the ancient than at Athens. The reaſon of that is, becauſe it has been long inhabited by a mixed multitude of different nations.

To conclude, the Greeks have left the moſt durable monuments of human wiſdom, fortitude, magnificence, and ingenuity, in their improvement of every art and ſcience, and in the fineſt writings upon every ſubject neceſſary, profitable, elegant, or entertaining.

The Greeks have furniſhed the brighteſt examples of every virtue and accompliſhment, natural or acquired, political, moral, or military: they excelled in mathematics and philoſophy; in all the forms of government, in architecture, navigation, commerce, war: as orators, poets, and hiſtorians, they ſtand as yet unrivalled, and are like to ſtand ſo for ever; nor are they leſs to be admired for the exerciſes and amuſements they invented, and brought to perfection, in the inſtitution of their public games, their theatres, and ſports.

180
No perfect tranſlation of any Greek author.

Let us further obſerve, that in vain our readers will look for theſe admired excellencies in any of the beſt tranſlations from the Greek: they may indeed communicate ſome knowledge of what the originals contain; they may preſent you with propoſitions, characters, and events: but allowing them to be more faithful and more accurate than they really are, or can well be, ſtill they are no better than copies, in which the ſpirit and luſtre of the originals are almoſt totally loſt. The mind may be inſtructed, but will not be enchanted: The picture may bear ſome faint reſemblance, and if painted by a maſterly hand give pleaſure; but who would be ſatisfied with the canvas, when he may poſſeſs the real object? who would prefer a piece of coloured glaſs to a diamond? It is not poſſible to preſerve the beauties of the original in a tranſlation.—The powers of the Greek are vaſtly beyond thoſe of any other tongue. Whatever the Greeks deſcribe is always felt, and almoſt ſeen; motion and muſic are in every tone, and enthuſiaſm and inchantment poſſeſs the mind:

> *Graiis ingenium, Graiis dedit ore rotundo,*
> *Muſa loqui.* Hor.

Sect. VIII. *Of the Latin Language.*

181
Origin of the Romans, and of their language.

This language, like every other ſpoken by barbarians, was in its beginning rough and uncultivated.—What people the Romans were, is a point in which antiquarians are not yet agreed. In their own opinion they were ſprung from the Trojans *; Dion. Halicar. derives them from the Greeks †; and Plutarch informs us ‡ that ſome people imagined that they were ſprung from the Pelaſgi. The fact is, they were a mixture of people collected out of Latium and the adjacent parts, which a variety of accidents had drawn together, to eſtabliſh themſelves on that mountainous region, in order to ſecure their own property, and plunder that of their neighbours. They were in all probability compoſed of Arcadians, Sabines, Latins, Hetruſcans, Umbrians, Oſcans, Pelaſgi, &c.; and if ſo, their language muſt have been a mixture of the different dialects peculiar to all theſe diſcordant tribes.

* *Tit. Liv.* lib. i. cap. 1. &c.
† *Antiq. Rom.* lib. i.
‡ *Vita Romul.*

The Latin language ought then to be a mingled maſs of the Arcadian, that is, the Æolian ‖ Greek, the Pelaſgic, Hetruſcan, and Celtic dialects. Theſe jarring elements, like the people to whom they belonged reſpectively, gradually incorporated, and produced what was afterwards called the *Latin* tongue.

‖ *Strabo,* lib. v. *Dionyſ. Halicarn Antiq.* lib. i.

The Arcadians were a Pelaſgic § tribe, and conſequently ſpoke a dialect of that ancient Greek produced by the coalition of this tribe with the ſavage aborigines of Greece. This dialect was the ground-work of the Latin. Every ſcholar allows, that the Æolian Greek, which was ſtrongly tinctured with the Pelaſgic, was the model upon which the Latin language was formed. From this deduction it appears, that the Latin tongue is much more ancient than the modern Greek; and of courſe we may add, that the Greek, as it ſtood before it was thoroughly poliſhed, bore a very near reſemblance to that language. Hence we think we may conclude, that the knowledge of the Latin language is neceſſary in order to underſtand the Greek. Let us not then expect to find the real ingredients of the Greek tongue in the academic groves of Athens, or in Smyrna, or in Rhodope, or in Hæmos; but on the banks of the Tiber and on the fields of Laurentum.

§ *Strabo et Herodotus.*

A very conſiderable part of the Latin tongue was derived from the Hetruſcan. That people were the maſters of the Romans in every thing ſacred. From them they learned the ceremonies of religion, the method of arranging games and public feſtivals, the art of divination, the interpretation of omens, the method of luſtrations, expiations, &c. It would, we believe, be eaſy to prove, that the Pelaſgi * and Hetruſci (x) were the ſame race of people; and if this was the caſe, their languages muſt have differed in dialect only.

* *Thucydides,* lib. iv.

The Umbrian or Celtic enters deeply into the compoſition of the Latin tongue. For proof of this, we need only appeal to *Pelloutier*, *Bullet's Memoires de la Langue Celtique, partie premiere*, *Abbé Pezron's Origin of Ancient Nations*, &c. Whether the old Celtic differed eſſentially from the Pelaſgic and Hetruſcan, would be a matter of curious inveſtigation, were this a proper ſubject for the preſent article.

The Latin abounds with oriental words, eſpecially Hebrew, Chaldaic, and Perſian. Theſe are certainly remains of the Pelaſgic and Hetruſcan tongues, ſpoken originally by people who emigrated from regions where thoſe were parts of the vernacular language.—The

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(x) The Hetruſci were variouſly denominated by the Greeks and Romans. The former called them τυρσηνοι; which was their true name, for they actually emigrated from Tarſhiſh, or the weſtern coaſt of Aſia Minor, and conſequently Herodotus everywhere calls them τυρσανοι. The Æolians changed α into υ; hence in that dialect they were called τυρσηνοι, from *Tarſus*. The Romans ſtyled them *Tuſci*, probably from the Greek verb θυω, *ſacriſico*, alluding to the ſkill which that people profeſſed in the ceremonies of religion. They called their country *Hetruria*, we think from the Chaldaic word *heretum*, "a magician or ſorcerer;" a name deduced from their ſkill in divination.

Greeks, in polishing their language, gradually distorted and disfigured vast numbers of the rough eastern vocables, which made a very great part of it. (See the preceding section).

The Romans, of less delicate organs, left them in their natural state, and their natural air readily bewrays their original. We had collected a large list of Latin words still current in the east; but find that Thomassin † and Ogerius (Y), and especially Monſ. Gebelin, in his most excellent Latin Dictionary, have rendered that labour superfluous.

In this language, too, there are not a few Gothic terms. How these found their way into the Latin, it is not easy to discover, unless, as Pelloutier supposes, the Celtic and Gothic languages were originally the same: or perhaps we may conjecture, that such words were parts of a primitive language, which was at one time universal.

182 How far the Latin resembles the Greek.

There are, besides, in the Latin a great number of obsolete Greek words, which were in process of time obliterated, and others substituted in their room; so that, upon the whole, we are persuaded, that the most effectual method to distinguish the difference between the early and modern Greek, would be to compare the ancient Latin with the latter; there being, we imagine, very little difference between the ancient Greek and Latin in the earliest periods.

However that may be, it is certain that the Roman letters were the same with the ancient Greek.—*Formæ literis Latinis quæ veterrimis Græcorum*, says Tacitus *; and Pliny † says the same thing, and for the truth of his assertion he appeals to a monument extant in his own times.

These old Greek letters were no other than the Pelasgic, which we have shown from Diodorus Siculus (see preceding Section) to have been prior to the Cadmean. For the figure of these letters, see Astle, Postellus, Montfaucon, Palægraphia Græca, Monſ. Gebelin, and our Plates XV and XVI.

That the Latins borrowed the plan of their declensions from the Greeks, is evident from the exact resemblance of the terminations of the cases throughout the three similar declensions. In nouns of the first declension, the resemblance is too palpable to stand in need of illustration. In the second, the Greek genitive is ου. In Latin the *o* is thrown out, and the termination becomes *i*. In the Greek section, we have observed, that the sounds of ι and υ differed very little; therefore the Latins used ι instead of υ. The Latin dative ends in *o*, which is the Greek dative, throwing away ι *subscriptum*, which was but faintly sounded in that language. No genuine Greek word ended in μ or *m*.

The Hellenes seemed to have abhorred that bellowing liquid; it is, however, certain that they imported it from the east, as well as the other letters, and that they employed it in every other capacity, except in that of closing words. In the termination of flexions, they changed it into ν.

The Latins retained *m*, which had been imported to them as a terminating letter at an era before the Greek language had undergone its last refinement.—Hence the Latin accusative in *um*, instead of the Greek ον. The vocative case, we imagine, was in this declension originally like the nominative. The Latins have no dual number, because, in our opinion, the Æolian dialect, from which they copied, had none. It would be, we think, a violent stretch of etymological exertion, to derive either the Latin genitive plural of the second declension from the same case of the Greek, or that of the latter from the former; we therefore leave this anomaly, without pretending to account for its original formation. The third declensions in both languages are so exactly parallel, that it would be superfluous to compare them. The dative plural here is another anomaly, and we think a very disagreeable one, which we leave to the conjectures of more profound etymologists.

For the other peculiarities of Latin nouns, as they are nearly similar to those of the Greek, we must beg leave to remit our readers to that section for information.

183 Deficiency of articles.

The Latins have no articles, which is certainly a defect in their language. The Pelasgic, from which they copied, had not adopted that word in the demonstrative sense. Homer indeed seldom uses it; and the probability is, that the more early Greek used it less frequently, at least in the sense above-mentioned. Thus in Latin, when I say, *video hominem*, it is impossible to find out by the bare words whether the word *hominem* intimates "a man," or "the man;" whereas in Greek it would be Βλεπω ἀνθρωπον, *I see a man*, Βλεπω τον ανθρωπον, *I see the man*. Hence the first expression is indefinite, and the second definite.

184 Origin of the substantive verb,

The substantive verb *sum* in Latin seems to be partly formed from the Greek and partly not. Some of the persons of the present tense have a near resemblance to the Greek verb ἐω or ἐιμι, while others vary widely from that archetype. The imperfect præterite and præterperfect have nothing common with the Greek verb, and cannot, we think, be forced into an alliance with it. The future *ero*, was of old *eso*, and is indeed genuine Greek. Upon the whole, in our apprehension the Latin substantive verb more nearly resembles the Persian verb *hesten* than that of any other language we are acquainted with.

185 and of other verbs.

From what exemplar the Latin verbs were derived, is not, we think, easily ascertained. We know that attempts have been made to deduce them all from the Æolic Greek, and that the Romans themselves were extremely fond of this chimera; but the almost numberless irregularities, both in the formation and conjugation of their verbs, induce us to believe that only a part of them were formed upon that model. We are apt to think that the terminations in *bam*, *bas*, *bat*, *bamus*, &c. are produced by their union with a fragment of some obsolete verb, which is now wholly lost. In the verb *amo*, e. g. we are sure that the radix *am* is the Hebrew word *mother*; but how *am-abam*, *am-abo*, *am-arem* were fabricated, and connected with the radical *am*, is not so easily determined. That Latin verbs are composed of an inflexible radix and another flexible verb, as well as the Greek, cannot be doubted; but what this flexible

† *Glossary.*

* *Tacitus, Anal.* lib. ii.

† *Nat. Hist.* lib. vii. cap. 58.

(Y) *Græca et Latina lingua Hebraizantes*, Venice 1763. If these books are not at hand, Dr Littleton's Dictionary will, in a good measure, supply their place.

flexible auxiliary was, we think, cannot now be clearly aſcertained. It is not altogether improbable that ſuch parts of the verbs as deviate from the Greek archetype were ſupplied by fragments of the verb *ha*, which pervades all the branches of the Gothic language, and has, we think, produced the Latin verb *habeo.* When the Greeks began to etymologize, they ſeldom overpaſſed the verge of their own language: the Latins purſued nearly the ſame courſe. If their own language preſented a plauſible etymology, they embraced it; if not, they immediately had recourſe to the Greek; and this was the *ne plus ultra* of their etymological reſearches. Cicero, Quintilian, Feſtus, &c. and even Varro, the moſt learned of all the Romans, ſtop here; all beyond is either doubt or impenetrable darkneſs. The opinion abovementioned we offer only as a conjecture; the deciſion we leave to more able critics.

186 Deficiencies in Latin verbs.

The want of aoriſts or indefinite tenſes ſeems to us a palpable defect in the Latin language. The uſe of theſe among the Greeks enabled the writer to expreſs the ſpecific variations of time with more accuracy and preciſion than the Latins, who never attempted to ſpecify them by any other tenſes but the imperfect and pluperfect. Indeed we ſhould imagine, that both the Greeks and Latins were much inferior to the Engliſh in this reſpect. The Latin word *lego*, for example, may be tranſlated into Engliſh three different ways: 1ſt, *I read;* 2d, *I do read;* 3d, *I am reading.*

187 Irregularities in the conjugations.

The Latins, in reducing verbs to their four conjugations, formed their inflexions in a very irregular manner. Many verbs of the firſt claſs inflect their præterite and ſupine like thoſe of the ſecond: thus *domo*, inſtead of giving *avi* and *atum*, has *ui* and *itum*, like *monui* and *monitum*. Again, not a few verbs of the third conjugation have *ivi* and *itum*, as if they belonged to the fourth; e. g. *pĕto, petivi, petitum.* Then, ſome verbs have *io* in the preſent, *ivi* in the præterite, and *itum* in the ſupine, while, contrary to the rules of analogy, they in reality belong to the third: ſuch are *cupio, cupivi, cupitum, cupere*, &c. Some verbs of the ſecond conjugation have their præterite and ſupine as if they belonged to the third; thus, *jubeo, juſſi, juſſum, jubere; augeo, auxi, auctum, augere.* Some verbs, which are actually of the fourth conjugation, have their præterite and ſupine as if they were of the third; thus *ſentio, ſenſi, ſenſum, ſentire; haurio, hauſi, hauſtum, haurire*, &c. If theſe are not manifeſt irregularities, we cannot ſay what deſerves the name. The fact ſeems to ſtand thus: The Romans were originally a banditti of robbers, bankrupts, runaway ſlaves, ſhepherds, huſbandmen, and peaſants of the moſt unpoliſhed character. They were engaged in perpetual broils and quarrels at home, and ſeldom enjoyed repoſe abroad. Their profeſſion was robbery and plunder. Like old Iſhmael, their hands were againſt every man, and every man's hand againſt them. In ſuch a ſtate of ſociety no time was left for cultivating the ſciences. Accordingly the arts of war and government were their ſole profeſſion. This is ſo true, that their own poet characterizes them in the following manner:

Excudunt alii ſpirantia mollius æra, &c.

188 The Latin deficient in participles.

Another blemiſh in the Latin tongue is occaſioned by its wanting a participle of the præterite tenſe in the active voice. This defect is perpetually felt, and is the cauſe of an aukward circumlocution wherever it happens to preſent itſelf. Thus, "The general having croſſed the river, drew up his army;" *Imperator, cum tranſiiſſet flumen, aciem inſtruxit.* Here *cum tranſiiſſet flumen* is a manifeſt circumlocution, which is at once avoided in the Greek ὁ ἡγεμων περασας τον ποταμον, &c. This muſt always prove an incumbrance in the caſe of active intranſitive verbs. When active deponent verbs occur, it is eaſily avoided. Thus, "Cæſar having encouraged the ſoldiers, gave the ſignal for joining battle;" *Cæſar cohortatus milites, prœlii committendi ſignum dedit.*

Another palpable defect in this language ariſes from the want of a participle of the preſent paſſive. This again muſt produce an inconveniency upon many occaſions, as will be obvious to every Latin ſtudent almoſt every moment.

189 Supines and gerunds.

The two ſupines are univerſally allowed to be ſubſtantive nouns of the fourth declenſion. How theſe aſſumed the nature of verbs it is not eaſy to determine. When they are placed after verbs or nouns, the matter is attended with no difficulty; but how they ſhould acquire an active ſignification, and take the caſe of the verb with which they are connected, implies, we ſhould think, a ſtretch of prerogative.

The Latin gerunds form another unnatural anomaly. Every Latin ſcholar knows that thoſe words are nothing but the neuters of the participles of the future paſſive. The fabricators of the Latin tongue, however, elevated them from their primary condition, giving them upon many occaſions an active ſignification. In this caſe we muſt have recourſe to

————————*Si volet uſus,*
Quem penes arbitrium eſt et jus et norma loquendi.

Another inconveniency, perhaps more ſeverely felt than any of the preceding, ariſes from the want of the uſe of the preſent participle of the verb *ſum.* Every body knows what a conveniency is derived from the frequent uſe of the participle ων in Greek; and indeed it appears to us ſomewhat ſurpriſing that the Latins neglected to introduce the participle *ens* into their language. In this we believe they are ſingular. Here again a circumlocution becomes neceſſary in ſuch a caſe as the following: "The ſenate being at Rome, paſſed a decree." Inſtead of ſaying *ſenatus ens Romæ, legem tulit*, we are obliged to ſay *cum ſenatus Romæ eſſet*, &c. If the words *ens* or *exiſtens* had been adopted, as in the Greek, this odious circumlocution would have been avoided.

Many other defects of the like kind will occur to every perſon who ſhall chooſe to ſearch for them, and thoſe in the moſt approved claſſical authors. Perhaps our mentioning ſo many may be deemed invidious by the admirers of that language; but we write from conviction, and that muſt be our apology.

190 Different genius of the Latin and Greek languages.

If one take the trouble to compare the ſtructure of the Greek and Latin languages, he will, we think, quickly be convinced that their characteriſtic features are extremely different. The genius of the former ſeems eaſy and natural; whereas that of the latter, notwithſtanding the united efforts of poets, orators, and philoſophers, ſtill bears the marks of violence and reſtraint. Hence it appears that the Latin tongue was preſſed into the ſervice, and compelled almoſt againſt its will to bend to the laws of the Grecian model. Take a ſentence of

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Hebrew, Chaldean, Arabic, &c. and try to tranſlate it into Greek without regarding the arrangement of the words, and you will find it no difficult attempt; but make the ſame trial with reſpect to the Latin, and you will probably find the labour attended with conſiderable difficulty. To tranſlate Greek into Engliſh is no laborious taſk; the texture of the two languages is ſo congenial, that the words and phraſes, and even the idiomatic expreſſions, naturally ſlide into each other. With the Latin the caſe is quite otherwiſe; and before elegant Engliſh can be produced, one muſt deviate conſiderably from the original. Should we attempt to tranſlate a piece of Engliſh into Greek, and at the ſame time into Latin, the tranſlation of the former would be attended with much leſs difficulty than that of the latter, ſuppoſing the tranſlator equally ſkilled in both languages.

191 Cauſes of this difference.

This incongruity ſeems to ſpring from the following cauſe. Before any man of conſiderable abilities, either in the capacity of a poet, grammarian, or rhetorician, appeared at Rome, the language had acquired a ſtrong and inflexible tone, too ſtubborn to be exactly moulded according to the Grecian ſtandard. After a language has continued ſeveral centuries without receiving a new poliſh, it becomes like a full grown tree, incapable of being bent to the purpoſes of the mechanic. For this reaſon, it is highly probable, that the tongue in queſtion could not be forced into a complete aſſimilation with the Greek. Notwithſtanding all theſe obſtructions, in proceſs of time it arrived at ſuch an exalted pitch of perfection, as to rival, perhaps to excel, all the other European languages, the Greek only excepted. Had men of the taſte, judgement, and induſtry of Ennius, Plautus, Terence, Cicero, and the worthies of the Auguſtan age, appeared in the early ſtages of the Roman commonwealth, we may believe that their language would have been thoroughly reduced to the Grecian archetype, and that the two dialects might have improved each other by a rivalſhip between the nations who employed them.

Without pretending to entertain our readers with a pompous and elaborate account of the beauties of that imperial language which have been detailed by writers almoſt without number, we ſhall endeavour to lay before them as briefly as poſſible its priſtine character, the ſteps and ſtages by which it gradually roſe to perfection, the period when it arrived at the ſummit of its excellence, and by what means it degenerated with a rapid career till it was loſt among thoſe very people to whom it owed its birth.

192 The Latin tongue compoſed chiefly of Pelaſgic and Celtic words.

We have obſerved already, that the Latin tongue was a *colluvies* of all the languages ſpoken by the vagrant people who compoſed the firſt elements of that republic. The prevailing dialects were the Pelaſgic or Hetruſcan, which we think were the ſame; and the Celtic, which was the aboriginal tongue of Italy. Hence the primary dialect of the Romans was compoſed of diſcordant materials, which in our opinion never acquired a natural and congenial union. Be that as it may, this motley mixture was certainly the original dialect of the Romans. The Pelaſgic or Hetruſcan part of it retained a ſtrong tincture of the oriental tongues. The Celtic part ſeems to have been prevalent, ſince we find that moſt of the names of places, eſpecially in the middle and northern parts of Italy, are actually of Celtic original. It is therefore clear that the ſtyle of the firſt Romans was compoſed of the languages above mentioned. Who theſe firſt Romans were, we believe it is impoſſible to determine with any degree of certainty. The Roman hiſtorians afford us as little information upon that ſubject, as their etymologiſts do upon the origin of their language. Their moſt celebrated writers upon this point were Ælius Gallus, Quintus Cornificius, Nonius Marcellus, Feſtus, and ſome others of leſs note. At the head of theſe we ought to place Terentius Varro, whom Cicero ſtyles the moſt learned of all the Romans. From theſe writers we are to expect no light. Their etymologies are generally childiſh and futile. Of the language of the moſt ancient Romans we can only reaſon by analogy; and by that means we can diſcover nothing more than what we have advanced above.

In the firſt place we may reſt aſſured that the dual number, the articles, the participle above mentioned, the aoriſts, and the whole middle voice, never appeared in the Latin tongue; and accordingly were not current in thoſe languages from which it was copied, at leaſt at the time when it was firſt fabricated.

Beſides all this, many circumſtances concur to render it highly probable that, in the earlieſt period of the language, very few inflexions were introduced. 1ſt, When the Pelaſgi left Greece, the Greek language itſelf was not fully poliſhed. 2d, The Arcadians were never thoroughly cultivated. They were a ruſtic paſtoral people, and little minded the refinements of a civilized ſtate; conſequently the language they brought into Italy at that era muſt have been of a coarſe and irregular contexture. 3d, When the Theſſalian * Pelaſgi arrived in Italy about the time of Deucalion, the Greek itſelf was rude and barbarous; and, which is ſtill of more conſequence, if we may credit Herodotus quoted in the former ſection, that people had never adopted the Hellenic tongue. Hence it appears, that the part of the Latin language derived from the Pelaſgic or Hetruſcan (for thoſe we believe to have been the ſame) muſt have taken a deep tincture from the oriental tongues. (See preceding Section). If we may judge of the Celtic of that age by that of the preſent, the ſame character muſt likewiſe have diſtinguiſhed its ſtructure.

* Dionyſ. Halicarn. lib. i.

193 Hence not inflected in its original ſtate.

From theſe circumſtances, we think it appears that the earlieſt language of the Romans was very little diverſified with inflexions. It nearly reſembled the oriental exemplar, and conſequently differed widely from the modern Latin. The effect of this was, that the modern Romans could not underſtand the language of their early progenitors. Polybius †, ſpeaking of the earlieſt treaty between the Romans and Carthaginians, makes the following obſervation: "Believe me then, the Roman language has undergone ſo many changes ſince that time

† Lib. 3.

(z) For proof of this our readers may conſult Abbé Pezron, Pelloutier, Bullet's *Mem.* Gebelin *Prel. Diſc.* &c. and many others.

time (A) to the preſent, that even thoſe who are moſt deeply ſkilled in the ſcience of antiquities cannot underſtand the words of that treaty but with the greateſt difficulty."

From this ſource we make no doubt has flowed that vaſt number of oriental words with which the Latin language is impregnated. Theſe were originally inflexible, like their brethren of the eaſt. They were not diſguiſed as they now are with prefixes, affixes, metatheſes, ſyncopas, antitheſes, &c. but plain and unadorned in their natural dreſs.

194
Bent afterward into the Grecian model.

After the Romans became acquainted with the Æolian Greeks, who gradually ſeized upon both coaſts of Italy towards the ſouth, which they called *Magna Græcia*, they began to affect a Grecian air, and to torture their language into that foreign contexture. It appears, however, that at firſt the Grecian garb ſat rather aukwardly, and ſeveral marks of violence were eaſily diſcerned. The moſt ancient ſpecimen of this kind that we can recollect conſiſts of the remains of the *twelve tables*. Here every thing is rude and of a clumſy caſt; for though by this time conſiderable progreſs had been made in refinement, and the language of Rome had begun to appear in a Grecian uniform, ſtill thoſe changes were not altogether natural. Soon after appeared Marcus Fabius Pictor and Siſenna; hiſtorians often quoted by Livy, but whoſe works are long ſince irrecoverably loſt. The Faſti Capitolini are often mentioned; but they too periſhed in the burning of the Capitol during the civil wars between Marius and Sylla. Had thoſe monuments eſcaped the ravages of time, we ſhould have been able to mark the progreſs of the Latin tongue from ſtage to ſtage, and to aſcertain with the greateſt accuracy its gradual configuration in the courſe of its progreſs towards the Grecian ſtandard. We muſt therefore leave the Latin tongue during thoſe periods rude and barbarous, and deſcend to others better known and more characteriſtically marked. Thoſe commenced after that

Græcia capta ferum victorem cepit, et artes
Intulit agreſti Latio.

195
The principal authors by whom it was gradually poliſhed.

In this period we find Ennius, who wrote a Roman hiſtory in hexameter verſe in 18 books, which he called *Annals;* moſt part of which is now loſt. He likewiſe tranſlated *Euhemerus de Origine Deorum;* a work often mentioned by the Chriſtian fathers in their diſputes with the Pagans. It is ſometimes quoted by Cicero. Then followed Caius Lucilius the famous ſatiriſt, and a number of other writers, ſuch as Accius, Valerius, Æditiuus, Alpinus, &c. whoſe fragments were publiſhed by the Stephens, Paris, 1564. All theſe imitated the writers of Greece or tranſlated from them. By their perſeverance and active exertions the ſpirit of theſe authors was transfuſed into the Latin tongue, and its ſtructure accommodated to the Grecian plan.

Plautus and Terence, by tranſlating the comedies of Menander and Diphilus into their own language, taught the Latin muſes to ſpeak Attic Greek. To ſpeak that language was then the *ton* of the times, as it is now with us to chatter French. Greek tutors were retained in every reputable family; and many Romans of the firſt rank were equally qualified to ſpeak or write both in Greek and Latin. The original jargon of Latium was now become obſolete and unintelligible; and Cato the Ancient condeſcended to learn the Greek language at 80.

196
The golden age of Rome.

To pretend to enumerate the various, and we may add inimitable, examples of the Auguſtan or golden age of the Roman tongue, would be an inſult to the underſtanding of our readers: we ſhall only take the liberty to tranſlate a few lines from a moſt excellent hiſtorian *, who, had his honeſty been equal to his judgement, might have rivalled the moſt celebrated writers of his country. Having obſerved, that the Greek authors, who excelled in every province of literature, had all made their appearance nearly about the ſame ſpace of time, confined within very narrow limits, he adds, "Nor was this circumſtance more conſpicuous among the Greeks than among the Romans; for unleſs we go back to the rough and unpoliſhed times, which deſerve commendation only on account of their invention, the Roman tragedy is confined to Accius and the period when he flouriſhed. The charming wit of Latin elegance was brought to light by Cecilius, Terentius, and Afranius, nearly in the ſame age. As for our hiſtorians (to add Livy alſo to the age of the former), if we except Cato and ſome old obſcure ones, they were all confined to a period of 80 years; ſo neither has our ſtock of poets extended to a ſpace much backward or forward. But the energy of the bar, and the finiſhed beauty of proſe eloquence, ſetting aſide the ſame Cato (by leave of P. Craſſus, Scipio, Lælius, the Gracchi, Fannius, and Ser. Galba, be it ſpoken), broke out all at once under Tully the prince of his profeſſion; ſo that one can be delighted with none before him, and admire none except ſuch as have either ſeen or were ſeen by that orator."

* *Velleius Paterculus,* lib. i. cap. *ult.*

From this quotation it plainly appears, that the Romans themſelves were convinced of the ſhort duration of the golden age of their language. According to the moſt judicious critics, it commenced with the era of Cicero's oratorical productions, and terminated with the reign of Tiberius, or perhaps it did not reach beyond the middle of that prince's reign. It is generally believed that eloquence, and with it every thing liberal, elevated, and manly, was baniſhed Rome by the deſpotiſm of the Cæſars. We imagine that the tranſition was too inſtantaneous to have been entirely produced by that unhappy cauſe. Deſpotiſm was firmly eſtabliſhed among the Romans about the middle of the reign of Auguſtus; and yet that period produced ſuch a group of learned men as never adorned any other nation in ſo ſhort a ſpace of time. Deſpotiſm, we acknowledge, might have affected the eloquence of the bar; the noble and important objects which had animated the republican orators being now no more: but this circumſtance could not affect poetry, hiſtory, philoſophy, &c. The ſtyle employed upon theſe ſubjects did not feel the fetters of deſpotiſm. The age of Louis XIV. was the golden period

197
Cauſes of the degeneracy of the Latin tongue.

(A) This treaty, according to the ſame hiſtorian, was concluded in the conſulſhip of Lucius Junius Brutus and Marcus Valerius, 28 years before Xerxes made his deſcent upon Greece.

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riod of the French tongue; and we think that age produced a race of learned men, in every department ſuperior in number and equal in genius to the literati who flouriſhed under the noble and envied conſtitution of Britain during the ſame age, though the latter is univerſally allowed to have been the golden period of this country. The Britiſh iſles, we hope, enjoy ſtill as much liberty as ever; yet we believe few people will aver, that the writers of the preſent age are equal either in ſtyle or in genius to that noble group who flouriſhed from the middle of the reign of Charles I. to the middle of the reign of George II.; and here deſpotiſm is quite unconcerned.

In the eaſt the ſame obſervation is confirmed. The Perſians have long groaned under the Mohammedan yoke; and yet every oriental ſcholar will allow, that in that country, and under the moſt galling tyranny, the moſt amazing productions of taſte, genius, and induſtry, that ever dignified human nature, have been exhibited. Under the Arabian caliphs, the ſucceſſors of Mohammed, appeared writers of a moſt ſublime genius, though never was deſpotiſm more cruelly exerciſed than under thoſe fanatics. The revival of letters at the era of the Reformation was chiefly promoted and cheriſhed by petty deſpotical princes.

We cannot therefore be perſuaded, that the deſpotiſm of the Cæſars baniſhed eloquence and learning from Rome. Longinus indeed has attributed this misfortune to that cauſe, and tells us, *θρεψαι τε γαρ ικανη τα φρονηματα των Μεγαλοφρονων ἡ* ΕΛΕΥΘΕΡΙΑ, &c. "It is liberty that is formed to nurſe the ſentiments of great geniuſes, to puſh forward the propenſity of conteſt, to inſpire them with hopes, and the generous ambition of being the firſt in rank." When Longinus wrote this, he did not reflect that he himſelf was a ſtriking inſtance of the unſoundneſs of his obſervation.

193 The writers of the ſilver age greater maſters of ſcience than their predeceſſors.

As to ſcience, the fact is undoubtedly on the other ſide. That Seneca was ſuperior to Cicero in philoſophy, cannot be reaſonably contradicted. The latter had read, and actually abridged, the whole extent of Grecian philoſophy: this diſplayed his reading rather than his learning. The former had addicted himſelf to the Stoic ſect; and though he does not write with the ſame flow of eloquence as Tully, he thinks more deeply and reaſons more cloſely. Pliny's Natural Hiſtory is a wonderful collection, and contains more uſeful knowledge than all the writings of the Auguſtan age conjoined into one maſs. We think the hiſtorical annals of Tacitus, if inferior to Livy in ſtyle and majeſty of diction, much ſuperior in arrangement and vigour of compoſition. In ſhort, we diſcover in theſe productions a deep inſight into human nature, an extenſive knowledge of the ſcience of government, a penetration which no diſſimulation could eſcape, together with a ſincere attachment to truth both with reſpect to events and characters; nor is he inferior in the majeſty, energy, and propriety of his harangues, wherever an equal opportunity preſents itſelf. Quintilian, Pliny the younger, Suetonius, Petronius Arbiter, and Juvenal, deſerve high eſteem; nor are they inferior to their immediate predeceſſors. We think there is good reaſon to conclude, that the loſs of liberty among the Romans did not produce the extinction of eloquence, ſcience, elevation of ſentiment, or refinement of taſte. There were, we believe, other circumſtances which chiefly contributed to produce that revolution.

Latin Language.

The ſame Velleius Paterculus whom we have quoted aſſigns ſome plauſible and very judicious reaſons for this cataſtrophe. "Emulation (ſays he) is the nurſe of genius; and one while envy, and another admiration, fires imitation. According to the laws of nature, that which is purſued with the greateſt ardour mounts to the top: but to be ſtationary in perfection is a difficult matter; and by the ſame analogy, that which cannot go forward goes backward. As at the on'ſet we are animated to overtake thoſe whom we deem before us, ſo when we deſpair of being able to overtake or to paſs by them, our ardour languiſhes together with our hope, and what it cannot overtake it ceaſes to purſue; and leaving the ſubject as already engroſſed by another, it looks out for a new one upon which to exert itſelf. That by which we find we are not able to acquire eminence we relinquiſh, and try to find out ſome object *elſewhere* upon which to employ our intellectual powers. The conſequence is, that frequent and variable tranſitions from ſubject to ſubject proves a very great obſtacle to perfection in any profeſſion."

This perhaps was the caſe with the Romans. The heroes of the Auguſtan age had borne away the prize of eloquence, of hiſtory, of poetry, &c. Their ſucceſſors deſpaired of being able to equal, much leſs to ſurpaſs them, in any of theſe walks. They were therefore laid under the neceſſity of ſtriking out a new path by which they might arrive at eminence. Conſequently Seneca introduced the *ſtile coupé*, as the French call it; that is, a ſhort, ſparkling, figurative diction, abounding with antitheſes, quaintneſſes, witticiſms, embelliſhed with flowers and meretricious ornaments; whereas the ſtyle of the Auguſtan age was natural, ſimple, ſolid, unaffected, and properly adapted to the nature of the ſubject and the ſentiments of the author.

The hiſtorian Salluſt laid the foundation of the unnatural ſtyle above mentioned. Notwithſtanding all the excellencies of that celebrated author, he everywhere exhibits an affectation of antiquity, an antithetical caſt, an air of auſterity, an accuracy, exactneſs, and regularity, contrary to that *air degagé* which nature diſplays in her moſt elaborate efforts. His words, his clauſes, ſeem to be adjuſted exactly according to number, weight, and meaſure, without exceſs or defect. Velleius Paterculus imitated this writer; and, as is generally the caſe with imitators, ſucceeded beſt in thoſe points where his archetype had failed moſt egregiouſly. Tacitus, however excellent in other reſpects, deviated from the Auguſtan exemplars, and is thought to have imitated Salluſt; but affecting brevity to exceſs, he often falls into obſcurity. The other contemporary writers employ a cognate ſtyle; and becauſe they have deviated from the Auguſtan ſtandard, their works are held in leſs eſtimation, and are thought to bear about them marks of degeneracy.

That degeneracy, however, did not ſpring from the deſpotic government under which theſe authors lived, but from that affectation of ſingularity into which they were led by an extravagant and childiſh deſire of diſtinguiſhing themſelves in their mode, as their predeceſſors had done in theirs. But the miſchiefs of this rage for innovation did not reach their ſentiments, as it had done their ſtyle; for in that point we think they were ſo far from falling below the meaſure of the writers of the former age, that in many inſtances they ſeem to have ſurpaſſed them.

With reſpect to ſentiment and mental exertions, the authors in queſtion preſerved their vigour, till luxury and effeminacy, in conſequence of power and opulence, enervated both the bodies and minds of the Romans. The contagion ſoon became univerſal; and a liſtleſſneſs, or intellectual torpor, the uſual concomitant of luxury, ſpread indolence over the mental faculties, which rendered them not only averſe to, but even incapable of, induſtry and perſeverance. This lethargic diſpoſition of mind ſeems to have commenced towards the concluſion of the ſilver age; that is, about the end of the reign of Adrian. It was then that the Roman eagle began to ſtoop, and the genius of Rome, as well in arts as in arms, began to decline. Once more, the declenſion of the intellectual powers of the writers of that nation did not ariſe from the form of the government, but from the cauſes above ſpecified.

As the Roman genius, about that period, began to decline, ſo the ſtyle of the ſilver age was gradually vitiated with barbariſms and exotic forms of ſpeech. The multitudes of barbarians who flocked to Rome from all parts of the empire; the ambaſſadors of foreign princes, and often the princes themſelves, with their attendants; the prodigious numbers of ſlaves who were entertained in all the conſiderable families of the capital, and over all Italy; the frequent commerce which the Roman armies upon the frontiers carried on with the barbarians; all concurred to vitiate the Latin tongue, and to interlard it with foreign words and idioms. In ſuch circumſtances, it was impoſſible for that or any other language to have continued pure and untainted.

This vitiated character both of ſtyle and ſentiment became more and more prevalent, in proportion as it deſcended from the reign of Adrian towards the era of the removal of the imperial ſeat from Rome to Conſtantinople. Then ſucceeded the iron age, when the Roman language became abſolutely rude and barbarous.

199
Writers of great talents during the ſilver and brazen ages.

Towards the cloſe of the ſilver, and during the whole courſe of the brazen age, there appeared, however, many writers of no contemptible talents. The moſt remarkable was Seneca the ſtoic, the maſter of Nero, whoſe character both as a man and a writer is diſcuſſed with great accuracy by the noble author of the *Characteriſtics*, to whom we refer our readers.

About the ſame time lived Perſius the ſatiriſt, the friend and diſciple of the ſtoic Cornutus; to whoſe precepts he did honour by his virtuous life; and by his works, though ſmall, he ſhowed an early proficiency in the ſcience of morals.

Under the mild government of Adrian and the Antonines lived Aulus Gellius, or (as ſome call him) Agellius; an entertaining writer in the miſcellaneous way, well ſkilled in criticiſm and antiquity. His works contain ſeveral valuable fragments of philoſophy, which are indeed the moſt curious part of them.

With Aulus Gellius we may rank Macrobius; not becauſe he was a contemporary (for he is ſuppoſed to have lived under Honorius and Theodoſius), but from his near reſemblance in the character of a writer. His works, like thoſe of the other, are miſcellaneous; filled with mythology and ancient literature, with ſome philoſophy intermixed.

In the ſame age with Aulus Gellius flouriſhed Apuleius of Madaura in Africa; a Platonic writer, whoſe matter in general far exceeds his perplexed and affected ſtyle, too conformable to the falſe rhetoric of the age in which he lived.

Boethius was deſcended from one of the nobleſt of the Roman families, and was conſul in the beginning of the ſixth century. He wrote many philoſophical works; but his ethic piece on the Conſolation of Philoſophy deſerves great encomiums, both for the matter and the ſtyle; in which latter he approaches the purity of a far better age than his own. By command of Theodoric king of the Goths this great and good man ſuffered death; and with him the Latin tongue, and the laſt remains of Roman dignity, may be ſaid to have ſunk in the weſtern world.

There were beſides a goodly number both of poets and hiſtorians who flouriſhed during this period; ſuch as Silius Italicus, Claudian, Auſonius, &c. poets and hiſtorians to a very great number, for whom our readers may conſult *Joh. Alberti Fabricii Bibl. Lat.*

200
Elegant eccleſiaſtical writers in Latin.

There flouriſhed, too, a number of eccleſiaſtical writers, ſome of whom deſerve great commendation. The chief of theſe is Lactantius, who has been deſervedly dignified with the title of the *Chriſtian Cicero.*

The Roman authors amount to a very ſmall number in compariſon of the Greek. At the ſame time, when we conſider the extent and duration of the Roman empire, we are juſtly ſurpriſed to find ſo few writers of character and reputation in ſo vaſt a field. We think we have good reaſon to agree with the prince of Roman poets in the ſentiment already quoted.

201
Excellency and uſefulneſs of the Latin tongue.

Upon the whole, the Latin tongue deſerves our attention beyond any other ancient one now extant. The grandeur of the people by whom it was ſpoken; the luſtre of its writers; the empire which it ſtill maintains among ourſelves; the neceſſity we are under of learning it in order to obtain acceſs to almoſt all the ſciences, nay even to the knowledge of our own laws, of our judicial proceedings, of our charters; all thoſe circumſtances, and many others too numerous to be detailed, render the acquiſition of that imperial language in a peculiar manner at once improving and highly intereſting. Spoken by the conquerors of the ancient nations, it partakes of all their revolutions, and bears continually their impreſſion. Strong and nervous while they were employed in nothing but battles and carnage, it thundered in the camps, and made the proudeſt people to tremble, and the moſt deſpotic monarchs to bend their ſtubborn necks to the yoke. Copious and majeſtic, when, weary of battles, the Romans inclined to vie with the Greeks in ſcience and the graces, it became the learned language of Europe, and by its luſtre made the jargon of ſavages diſappear who diſputed with it the poſſeſſion of that quarter of the globe. After having controlled by its eloquence, and humanized by its laws, all thoſe people, it became the language of religion. In ſhort, the Latin language will be ſtudied and eſteemed as long as good ſenſe and fine taſte remain in the world.

Celtic Language.

Sect. IX. *Celtic, Gothic, and Sclavonian Languages.*

§ 1. *Of the Celtic Language.*

In treating of the origin of the Latin tongue (ſee Sect. VIII.), we obſerved that a great part of it is derived from the Celtic. We ſhall now endeavour to give ſome account of the origin and extent of that ancient language; ſtill leaving the minutiæ to grammars and dictionaries, as we have done with reſpect to the other dialects which have fallen under our conſideration. Our candid readers, it is hoped, will remember, that we are acting in the character of philologers, not in that of grammarians and lexicographers.

202 Origin of the Celts, The deſcendants of Japhet having peopled the weſtern parts of Aſia, at length entered Europe. Some broke into that quarter of the globe by the north, others found means to croſs the Danube near its mouth. Their poſterity gradually aſcended towards the ſource of that river; afterwards they advanced to the banks of the Rhine, which they paſſed, and thence ſpread themſelves fas ar as the Alps and the Pyrenees.

Theſe people, in all probability, were compoſed of different families; all, however, ſpoke the ſame language; their manners and cuſtoms bore a near reſemblance; there was no variety among them but that difference which climate always introduces. Accordingly they were all known, in the more early times, by the general name of *Celto-ſcythæ*. In proceſs of time, becoming exceedingly numerous, they were divided into ſeveral nations, which were diſtinguiſhed by different names and territorial appellations. Thoſe who inhabited that large country bounded by the ocean, the Mediterranean, the Rhine, the Alps, and the Pyrenees, were denominated *Gauls* or *Celts*. Theſe people multiplied ſo prodigiouſly in the ſpace of a few centuries, that the fertile regions which they then occupied could not afford them the means of ſubſiſtence. Some of them now paſſed over into Britain; others croſſed the Pyrenees, and formed ſettlements in the northern parts of Spain. Even the formidable barriers of the Alps could not impede the progreſs of the Gauls: they made their way into Italy, and colonized thoſe parts which lie at the foot of the mountains; whence they extended themſelves towards the centre of that rich country. 203 part of whom were denominated *Gauls*.

By this time the Greeks had landed on the eaſtern coaſt of Italy, and founded numerous colonies in thoſe parts. The two nations vying as it were with each other in populouſneſs, and always planting colonies in the courſe of their progreſs, at length rencountered about the middle of the country. This central region was at that time called *Latium*. Here the two nations formed one ſociety, which was called *the Latin nation*. The languages of the two nations were blended together; and hence, according to ſome, the Latin is a mixture of Greek and Gaelic.

As the Gauls were a brave and numerous people, they certainly maintained themſelves in their priſtine poſſeſſions, uninvaded, unconquered, till their civil animoſities and domeſtic quarrels expoſed them as a prey to thoſe very Romans whom they had ſo often defeated, and ſometimes driven to the brink of deſtruction. They were not a people addicted to commerce; and, upon the whole, conſidering their ſituation both in their primary ſeats and afterwards in Italy, they had little temptation or opportunity to mingle with foreigners. Their language, therefore, muſt have remained unmixed with foreign idioms. Such as it was when they ſettled in Gaul, ſuch it muſt have continued till the Roman conqueſts. If therefore there is one primitive language now exiſting, it muſt be found in the remains of the Gaelic or Celtic. It is not, then, ſurpriſing, that ſome very learned men, upon diſcovering the coincidence of very great numbers of words in ſome of the Greek dialects with other words in the Celtic, have been inclined to eſtabliſh a ſtrict affinity between theſe languages. The ancient Pelaſgic and the Celtic at leaſt muſt have nearly reſembled each other, admitting a dialectical difference only, and that diſcrimination which climate and a long period of time muſt always produce. 204 Reſemblance between their language and that of the Pe-

Some have thought that the Gauls had [illegible] their native language ſoon after their country was conquered by the Romans; but *Monſieur Bullet*, in his *Memoires de la Langue Celtique*, has proved almoſt to a demonſtration, that the vulgar among thoſe people continued to ſpeak it ſeveral centuries after that period. When a great and populous nation has for many ages employed a vernacular tongue, nothing can ever make them entirely relinquiſh the uſe of it, and adopt unmixed that of their conquerors.

Many learned men, among whom is the lexicographer above mentioned, have ſhown that all the local names in the north of Italy are actually of Celtic extraction. Theſe names generally point out or deſcribe ſome circumſtances relating to the nature of their ſituation; ſuch as expoſure, eminence, lowneſs, moiſtneſs, dryneſs, coldneſs, heat, &c. This is a very characteriſtic feature of an original language; and in the Celtic it is ſo prominent, that the Erſe names of places all over Scotland are, even to this day, peculiarly diſtinguiſhed by this quality. We have heard a gentleman, who was well ſkilled in the dialect of the Celtic ſtill ſpoken in the Highlands of Scotland, propoſe to lay a bet, at very great odds, that if one ſhould pronounce the name of any village, mountain, river, gentleman's ſeat, &c. in the old Scottiſh dialect, he ſhould be able, by its very name, to give a pretty exact deſcription of its local ſituation.

To diſcover the ſources from which the Celtic tongue is derived, we muſt have recourſe to the following expedients.

1. We muſt conſult the Greek and Latin authors, who have preſerved ſome Gaelic or Celtic terms in their writings.

2. We muſt have recourſe to the Welſh and *Bas Bretagne* dialects; in which, indeed, there are [illegible] new words, but theſe are eaſily diſtinguiſhed from the primitive ſtock.

3. If any would trace another ſource of the Celtic, he muſt converſe with the country people and peaſants, who live at a diſtance from cities, in all countries where it was once the vernacular tongue. We have been credibly informed, that a Highland gentleman crossing the Alps for Italy, accidentally fell in with an old woman, a native of thoſe parts, who ſpoke a language ſo very ſimilar to his native tongue, that he could underſtand her with little difficulty; and that ſhe, on the other hand, underſtood moſt of his words. That an event of this nature ſhould actually take place is by no

means ſurpriſing, when we conſider that the Erſe ſpoken in the Highlands of Scotland is perhaps the moſt genuine remnant of the Celtic now exiſting, and at the ſame time reflect that there may be ſome remote cantons among thoſe wild and inacceſſible mountains, the *Alps*, where ſome remains of that tongue may ſtill be preſerved,

205
The moſt genuine remains of the Celtic in the Highlands of Scotland.

4. We have ſaid that the moſt genuine remains of the Gaelic tongue are to be found in the Highlands of Scotland; and the reaſon is obvious. The Scottiſh Highlanders are the unmixed unconquered poſterity of the ancient Britons, into whoſe barren domains the Romans never penetrated; not, we imagine, becauſe they were not able, ſince they ſubdued both North and South Wales, equally inacceſſible, but becauſe they found no ſcenes there either to fire their ambition or allure their avarice. Amidſt all the revolutions that from time to time ſhook and convulſed Albion, theſe mountainous regions were left to their primitive lords, who, like their ſouthern progenitors, hoſpitable in the extreme, did not, however, ſuffer ſtrangers to reſide long among them. Their language, accordingly, remained unmixed, and continues ſo even unto this day, eſpecially in the moſt remote parts and unfrequented iſlands.

The Norwegians ſubdued the weſtern iſlands of Scotland, at a time when the Scottiſh monarchy was ſtill in its minority. They erected a kind of principality over them, of which the iſle of Man was the capital. Though they maintained the ſovereignty of thoſe iſlands for ſome centuries, built many forts, and ſtrengthened them with garriſons, and in fine were the lawgivers and adminiſtrators of juſtice among the natives; yet we have been informed by the moſt reſpectable authority, that there is not at this day a ſingle vocable of the Norſe or Daniſh tongue to be found among theſe iſlanders. This fact affords a demonſtration of that ſuperſtitious attachment with which they were devoted to their vernacular dialects.

206
The Welſh dialect not pure, nor the Iriſh.

The Welſh dialect cannot, we think, be pure and unſophiſticated. The Siluses were conquered by the Romans, to whom they were actually ſubject for the ſpace of three centuries. During this period a multitude of Italian exotics muſt have been tranſplanted into their language; and indeed many of them are diſcernible at this day. Their long commerce with their Engliſh neighbours and conquerors hath adulterated their language, ſo that a great part of it is now of an Engliſh complexion. The Iriſh is now ſpoken by a race of people whoſe morality and ingenuity is nearly upon a level. Their lateſt hiſtorians have brought them from the confines of Aſia, through a variety of adventures, to people an iſland *extra anni ſoliſque vias*. However this genealogical tale may pleaſe the people for whom it was fabricated, we muſt ſtill ſuſpect that the Iriſh are of Celtic extraction, and that their forefathers emigrated from the weſtern coaſt of Britain at a period prior to all hiſtorical or even traditional annals. Ireland was once the *native land of ſaints*. The chief actors on this ſacred ſtage were Romaniſts, and deeply tinctured with the ſuperſtition of the times. They pretended to improve the language of the natives; and whatever their ſucceſs was, they improved it in ſuch a manner as to make it deviate very conſiderably from the original Celtic; ſo that it is not in Ireland that we are to look for the genuine characters of the dialect under conſideration.

Though the Hibernian tongue, in our opinion, differs conſiderably from the original Celtic, ſome very ingenious eſſays have been lately publiſhed by the learned and laborious members of the *Antiquarian Society of Dublin*; in which the coincidence of that tongue with ſome of the oriental dialects, has been ſupported by very plauſible arguments. In a diſſertation publiſhed in the year 1772, they have exhibited a collection of *Punico-Malteſe* words compared with words of the ſame import in Iriſh, where it muſt be allowed the reſemblance is palpable. In the ſame diſſertation they have compared the celebrated *Punic* ſcene in Plautus with its tranſlation into the Iriſh; in which the words in the two languages are ſurpriſingly ſimilar. If thoſe criticiſms are well founded, they will prove that the Celtic is coeval and congenial with the moſt ancient languages of the eaſt; which we think highly probable. Be that as it may, the Danes and Norwegians formed ſettlements in Ireland; and the Engliſh have long been ſovereigns of that iſland. Theſe circumſtances muſt have affected the vernacular idiom of the natives; not to mention the neceſſity of adopting the language of the conquerors in law, in ſciences, in the offices of religion.

207
Coincidence between the Celtic and Phœnician.

The inhabitants of the highlands and iſlands of Scotland are the deſcendants of thoſe Britons who fled from the power of the Romans, and ſheltered themſelves among the fens, rocks, and faſtneſſes of thoſe rugged mountains and ſequeſtered glens. They preferred thoſe waſtes and wilds, with liberty and independence, to the pleaſant and fertile valleys of the ſouth, with plenty embittered by ſlavery. They no doubt carried their language along with them; that language was a branch of the Celtic. With them, no doubt, fled a number of the druidical prieſts, who unqueſtionably knew their native dialect in all its beauties and varieties. Theſe fugitives in proceſs of time formed a regular government, elected a king, and became a conſiderable ſtate. They were ſequeſtered by their ſituation from the reſt of the world. Without commerce, without agriculture, without the mechanical arts, and without objects of ambition or emulation, they addicted themſelves wholely to the paſtoral life as their buſineſs, and to hunting and fiſhing as their diverſion. Thoſe people were not diſtinguiſhed by an innovating genius; and conſequently their language muſt have remained in the ſame ſtate in which they received it from their anceſtors They received it genuine *Celtic*, and ſuch they preſerved it.

When the Scots became maſters of the low country, and their kings and a great part of the nobility embraced the Saxon manners, and adopted the Saxon language, the genuine Caledonians tenaciouſly retained their native tongue, dreſs, manners, clanſhips, and feudal cuſtoms, and could never cordially aſſimilate with their ſouthern neighbours. Their language, therefore, could not be polluted with words or idioms borrowed from a people whom they hated and deſpiſed. Indeed it is plain from the whole tenor of the Scottiſh hiſtory, that neither Caledonian chieftans, nor their vaſſals, were ever ſteadily attached to the royal family after they fixed their reſidence in the low country, and became *Saxons*, as the Highlanders called them by way of reproach. Indeed the commerce between them and thoſe of the ſouth, till about a century and a half ago, was only tranſient and accidental; nor was their native dialect in the least affected by it.

208 Cause of the purity of the Scottish dialect of the ancient language.

Their language, however, did not degenerate; because there existed among them a distinct order of men whose profession obliged them to guard against that misfortune. Every chieftain retained in his family a bard or poet laureat, whose province it was to compose poems in honour of his lord, to commemorate the glorious exploits of his ancestors, to record the genealogy and connections of the family; in a word, to amuse and entertain the chief and his guests at all public entertainments and upon all solemn occasions. Those professors of the Parnassian art used to vie with each other; and the chiefs of families often assembled their respective bards, and encouraged them by considerable premiums to exert their poetic talents. The victor was rewarded and honoured, and the chieftain deemed it an honour to himself to entertain a bard who excelled his peers. The ancient Gauls, as we learn from Diodorus Siculus, Strabo, Tacitus, Lucan, &c. entertained persons of that profession; and certainly the ancient Britons did the same. Those bards were highly revered; their persons were deemed sacred; and they were always rewarded with fortunes in lands or cattle (see Scot on *Greeks*). Those poets, it is evident, would have watched over their vernacular dialect with the greatest care and anxiety; because in their compositions no word was to be lost, but as many gained as possible.

The use of letters was not known among the ancient Celts; their Druidical clergy forbade the use of them. All their religious rites, their philosophical dogmas, their moral precepts, and their political maxims, were composed in verses which their pupils were obliged to commit to memory. Accordingly letters were unknown to the Caledonian Scots, till they learned them either from their southern neighbours or from the Romans. The Irish, indeed, pretend to have letters of a very ancient date; the Highlanders of the country in question make no claim to the use of that invention. Their bards, therefore, committed every thing to memory; and of course the words of their language must have been faithfully preserved. We find that the celebrated poems of Ossian, and others of an inferior character, or at least fragments of such poems (see OSSIAN), have thus been preserved from father to son for more than 1000 years. The beauty, significancy, harmony, variety, and energy of these verses, strike us even in a prose translation: how infinitely more charming must they appear in their native form and poetical attire!

In order to exhibit the genius of the Celtic in as striking a light as the nature of our present design will permit, we shall lay before our readers a very contracted sketch of the Gaelic or Caledonian dialect as it now stands; which we hope will go a great way to convince them that this is the genuine offspring of the other. In doing this we shall borrow many hints from a gentleman * whose learning seems to equal his zeal for his native language: which, in compliance with the modern practice, we shall for the future distinguish by the name of *Gaelic*.

The Gaelic is not derived from any other language as far as we know, being obviously reducible to its own roots. Its combinations are formed of simple words of a known signification; and those words are resolvable into the simplest combinations of vowels and consonants, and even into simple sounds. In such a language we may expect that some traces will be found of the ideas and notions of mankind living in a state of primæval simplicity; and thus, a monument is still preserved of the primitive manners of the Celtic race while as yet under the guidance of simple nature, without any artificial refinement or ornament.

The natural sensations of heat and cold, and bodily pain, are expressed by articulate sounds, which, however, are not used in this language to denote heat, cold, or bodily pain. A sudden sensation of heat is denoted by an exclamation *aaf*; of cold, by *ii*, of bodily pain, by *oich*. All these sounds may be called *interjections*, being parts of speech which discover the mind to be seized with some passion. Few of the improved languages of Europe present so great a variety of sounds which immediately convey notice of a particular passion, exactly or precisely formed.

The pronouns *he* and *she* are expressed by the simple sounds *e* and *i*, and these are the marks of the masculine and feminine genders; for a neuter gender is unknown in the *Gaelic*. The compositions of rude and barbarous ages are universally found to approach to the measures and numbers of poetry; and this too is a distinguishing character of the *Gaelic*. Bodily sustenance will always be the principal concern of an uncultivated people. Hence *ed* or *eid* is used upon discovery of any animal of prey or game: it is meant to give notice to the hunting companion to be in readiness to seize the animal: and hence we believe *edo* "to eat" in Latin, and *ed* in Irish, signifies "cattle;" likewise in Scotch *edal* "cattle," literally signifies "the offspring or generation of cattle." *Coed* or *cued*, "share or portion of any subject of property," literally "common food." *Faed* "hunting," literally "gathering of food." *Edra* "the time of the morning when cattle are brought home from pasture to give milk," literally "meal-time." These are words importing the simplicity of a primitive state, and are common in the Gaelic idiom.

Traces of imitative language remain in all countries. The word used for *cow* in the Gaelic language is *bo*, plainly in imitation of the lowing of that animal.

In joining together original roots in the progress of improving language and rendering it more copious, its combinations discover an admirable justness and precision of thought, which one would scarce expect to find in an uncultivated dialect. It will, however, be found, upon examination, that the Gaelic language, in its combination of words, specifies with accuracy the known qualities, and expresses with precision the nature and properties which were attributed to the object denominated.

209 Excellency of Gaelic compounds.

An appears to have been a word of frequent use in this language, and seems to have been originally a name applied indefinitely to any object. According to Buliet, it was used to signify "a planet;" hence the *sun* had the name of ***grian***, which is a compound of ***gri*** "hot," and *an* "a planet." *Re* signifies originally and radically "division." The changes of the moon and the variety of her phases were early employed to point out the divisions of time. The present name for the *moon* is *gealach*; a word derived from her whiteness of colour. To these we might add a vast number more whose signification precisely indicates their shape, colour, effects, &c. Many of these would be found exactly similar to

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* Essays, &c. by James Grant, Esq; advocate.

Greek and Latin words of the ſame ſound and ſignification. In order to ſatisfy our curious readers, we ſhall annex a few, though ſome of them may perhaps be queſtionable.

The *Venus* of the Latins is ſaid to be a compound of *ben* and *jus*, which literally ſignify "the firſt woman," the letter *b* in Gaelic being ſoftened into *v*. Εδαρ and ειδαρ ſignify "food." Theſe words are compounded of the Gaelic words *ed* or *eid* and *ar;* the former denotes *food* ſimply, and the latter *ploughed land*. Theſe are the roots of the Greek and Latin words εδω, *edo;* αροω, *aro*. Εδρα, which ſignifies "a ſeat," has an evident reference to food. It is compounded of two Gaelic words *ed* and *ira*, which literally ſignifies "meal-time." Εδνα, which ſignifies "the preſents which a bridegroom made to his bride," is a compound of two Gaelic words *ed* and *na* or *nuah*, literally ſignifying "raw food." From *ar* there are many Greek derivatives. Αρουρα ſignifies "ploughed land," alſo "crop of corn;" Αρτος, "bread." In Gaelic *a crop of corn* and *bread* are expreſſed by *arbhar*, commonly pronounced *arar* and *aran;* all being equally derivatives of the root *ar*. So the Greek and Latin words αροτος, *arabilis*, "arable;" αροτρον, *aratrum*, "a plough;" αροτηρ, *arator*, "a ploughman;" and many others, are evidently derived from the ſame ſource. We would not, however, ſuggeſt, in conſequence of this coincidence, that either the Greek or Latin languages was derived from the Gaelic; we rather believe that theſe are remains of a primeval tongue, which are ſtill retained in all the three; and we produce them upon the preſent occaſion as preſumptions that the Gaelic is an original, underived language, and of courſe the moſt pure and unadulterated relick of the Celtic now exiſting. If our readers ſhould incline to know more of this ſubject, they may conſult Pezron's *Origin of Ancient Nations*, Bullet's *Mem. de la Langue Celtique*, Parſon's *Rem. of Japhet*, Gebelin's *Monde prim.* &c.

210
Copiouſneſs and antiquity of the Celtic.

When the Celtic language was generally ſpoken over Europe, it ſeems to have been amazingly copious. By conſulting Bullet's *Memoires*, it appears that its names for the common and various objects of nature were very numerous. The words denoting water, river, wood, foreſt, mountain, lake, &c. were moſt preciſely accommodated to ſpecify each modification and variety, with ſuch peculiar exactneſs as even the Greek, with all its boaſted idiomatical preciſion and copiouſneſs, has not been able to equal. The appearances which diverſify the viſible face of inanimate nature, arreſt the attention of men in an uncultivated ſtate. Unaccuſtomed to thought and abſtract reaſoning, their minds expand and exerciſe their powers upon ſenſible objects, and of courſe mark every *minutia* and almoſt imperceptible diſtinction with an accuracy to us ſeemingly impoſſible.

We hope it now appears to every reader, that the Celtic was one of the dialects of the primitive language; that it once overſpread by far the greateſt part of Europe; that the Gaelic now ſpoken in the northern parts of Scotland and the adjacent iſlands is the moſt pure and unmixed relick of that tongue now anywhere exiſting. We would willingly refer our readers to ſome well compoſed grammar of that language; but indeed we know of none that deſerves our recommendation. Some years ago we were flattered with the proſpect of ſeeing one publiſhed by a gentleman whoſe deep ſkill in that language is univerſally acknowledged. We have likewiſe heard of an intended dictionary of the ſame tongue; but hitherto our hopes have been diſappointed.

We are, however, happy to find that there is now publiſhing an excellent tranſlation of both the Old and New Teſtaments into Gaelic, which has hitherto been a deſideratum among thoſe who ſpeak this language. Such a tranſlation will at once contribute to preſerve that ancient tongue, and diſſeminate the knowledge of the truth among the natives of that country.

Every aſſiſtance towards acquiring the knowledge of a tongue which was once univerſal over a great part of Europe, will certainly be an acceptable preſent to the public. The antiquary, who is deſirous of tracing the affinity of languages, and wiſhes to mark the migrations of people, ought certainly to apply himſelf to the ſtudy of its remaining branches; and, if we miſtake not, he will ſoon be convinced, that they all breathe a ſpirit congenial to the manners and ſentiments of a people who are juſt entering upon the firſt ſtage of improvement and civilization.

211
Origin of the words *Gaul* and *Gal*.

Perhaps it may be expected, that, before we conclude this ſhort ſketch of the Celtic tongue, we ſhould give ſome account of the origin of the words *Gaul* and *Gal*, the two names by which this people was diſtinguiſhed by the Greeks and Romans. Mr M'Pherſon imagines, that the appellation of *Celt* is an adjective derived from *Gael*, the aboriginal name of the inhabitants of ancient Gaul. For our part, we can ſee no connection between *Gael* and *Kelt*, nor do we think that the latter is an adjective. We believe that thoſe people called themſelves *Cael* and not *Gael*. We are ſure that *Caledonia*, or *Cal-don* or *dun*, was an ancient name of the mountainous parts of Scotland.

Though many different opinions have been advanced with relation to the etymology of this word, we imagine that none is ſo probable as that which ſuppoſes that it is compounded of the two Celtic words *Cal* or *Kal*, that is, "Gal or Gaul," and *dun*, which ſignifies "a hill or mountain." Upon this ground, the Caledonii will import the Gauls of the mountains, or, which is the ſame, the Highland Gauls. The Iriſh and Highlanders reciprocally denominate themſelves by the general title of *Cael*, *Gael*, or *Gauls*. They alſo diſtinguiſh themſelves, as the Welch originally did, and as the Welch diſtinguiſh them both at preſent, by the appellation of *Guidhill*, *Guethel*, and *Gathel*. The intermediate *th*, they ſay, is left quieſcent in the pronunciation, as it is in many words of the Britiſh language; in which caſe *Gathel* would immediately be formed into *Gael;* and Gathel is actually ſounded like *Gael* by both the Iriſh and Highlanders at preſent. The appellation of *Gathel*, therefore, ſay they, was originally the ſame with *Gael*, and the parent of it. The quieſcent letters in Britiſh are frequently transferred from the middle to the concluſion of the word; by which manœuvre, *Gathel* is changed into *Galath*, *Galat*, *Galt*, and *Celt*. It is true, that *Gael* of the continent is univerſally denominated *Galatæ* and *Celtæ* by the Grecians, and *Gallt* and *Gallta* by the Iriſh. The appellations, therefore, of *Gathel-i*, *Gall-i*, *Gallat-æ*, *Calet-es*, *An-calit-es*, and *Celt-æ*, are all one and the ſame denomination, only varied by the aſtoniſhing ductility of the *Celtic*, and diſguiſed by the alterations ever incident to a language that has been merely oral for ages.

It may perhaps appear preſumptuous in us to differ from two ſuch reſpectable authorities as M'Pherſon and Whitaker: we muſt, however, acknowledge, that neither the one nor the other appears to us well founded. Beſides, they convey no idea of the ſignification of the words, though in the Celtic language they muſt have been ſignificant. The name *Gael*, the ſame with *Gal*, was probably given them in the Eaſt from the Greek γαλα, which in many oriental languages denotes *fair*; and γαλακτια may be eaſily derived from γαλα or γαλακτ, *Gal* or *Galatt*.— This denomination might be given them by their neighbours, in alluſion to their fair complexion.

§. 2. *Of the Gothic Language.*

THE Celtic and Gothic tongues at one time divided Europe between them. Both were of equal antiquity, both originated in Aſia, both were dialects of the original language of mankind. The Celtic, however, was firſt imported into Europe. The Gauls or Celts had penetrated fartheſt towards the weſt; a circumſtance which plainly intimates the priority of their arrival. In the population of countries, we believe it may be held as a maxim, that the colonies who emigrated firſt were generally impelled by ſucceeding emigrants; and that of conſequence the moſt early were puſhed forward to the parts moſt diſtant. The Celts, then, having overſpread the moſt weſtern parts of Europe, muſt have arrived more early in thoſe regions.

212 Ancient Gothic.

The Goths and Getæ were the ſame race of people, according to Procopius[*], *de bello Goth.*; and Strabo[†] (B) informs us, that they ſpoke the ſame language with the Thracians, from whoſe confines they had ſpread themſelves northward as far as the weſtern banks of the Danube. Vopiſcus, in the Hiſtory of Probus, tells us, that this emperor[‡] obliged "the Thracians, and all the Getic tribes, either to ſurrender or accept of his friendſhip." This expreſſion indicates, that the Thracians and the Getic tribes were deemed the ſame race of people. From this deduction it is clear, that the Getæ and Thracians were brethren; that they ſpoke the ſame language: and that their laws, manners, cuſtoms, and religious tenets, were the ſame, might eaſily be ſhown, were this a proper place for an inquiry of that nature.

[*] Lib. i. cap. 2.

[†] Lib ii. cap. 23.

213 The ſame with the language of the Thracians.

[‡] Lib. 7.

The Thracian language, as might be demonſtrated from names of perſons, offices, places, and cuſtoms, among that people, was nearly related to the Chaldean and other oriental languages.

214 Origin of the Goths.

They are thought to have been the deſcendants of Tiras, one of the ſons of Japhet, and conſequently muſt have preſerved the ſpeech of the Noachic family. The Gothic language abounds with *Pahlavi*, or old Perſic words, which are no doubt remains of the primeval dialect of mankind. The Thracians peopled a conſiderable part of the northern coaſt of Aſia Minor; and conſequently we meet with many names of cities, mountains, rivers, &c. in thoſe parts, exactly correſponding with many names in Europe, evidently impoſed by our Gothic progenitors. Any perſon tolerably acquainted with the remains of the Gothic tongue, will be able to trace theſe with little difficulty.

We learn from Herodotus[*], that Darius in his expedition againſt the wandering Scythians who lived on the other ſide of the Iſter or Danube, in his progreſs ſubdued the Getæ; and in the ſame paſſage the hiſtorian informs us, that theſe people held the immortality of the human ſoul, and that they were the braveſt and moſt juſt of all the Thracians. After this period, we find them mentioned by almoſt every Greek writer, even familiarly; for Geta, in the comedies of that nation, is a common name for a ſlave. The Getæ then occupied all that large tract of country which extended from the confines of Thrace to the banks of the Danube; were a brave and virtuous people; and ſpoke the ſame language with the Thracians, with whom they are often confounded both by Greek and Roman hiſtorians.

[*] Lib. iv.

But the name of *Goths* is by no means ſo ancient. It was utterly unknown both to the ancient Greeks and Romans. The firſt time that the name *Goth* is mentioned is in the reign of the emperor Decius, about the year of Chriſt 250. About that time they burſt out of Getia, and ruſhing like a torrent into the empire, laid waſte every thing with fire and ſword. The name of their leader or king was *Cneva*. Decius, endeavouring to expel them from Thrace, was vanquiſhed and ſlain.

After this irruption, we find them frequently in the Latin authors under the name of *Getæ* or *Gothi*; though the Greeks generally denominate them *Scythæ*. Torfæus tells us, that *get*[†] and *got* are actually the ſame word, which anciently, according to him, denoted a "ſoldier." *Got* in Icelandic ſignifies a "horſe or horſeman," and *gata* a "wanderer;" and this laſt was perhaps the import of the term *Geta*, they being originally an unſettled vagrant people. As nations generally aſſume to themſelves ſome high auſpicious denomination, we may believe the Goths did the ſame. We may therefore reſt ſatisfied, that the Getæ aſſumed the Icelandic name above mentioned as their national one: or perhaps, notwithſtanding their Greek denomination, they called themſelves *Gots* or *Goths* from the beginning.

[†] *Hiſtory of Norway*, lib. i.

215 Their [illegible] ſeat.

The original ſeat of the Goths was the country now called *Little Tartary*, into which they had extended themſelves from the frontiers of Thrace. This country was called *Little Scythia* by the Greek writers; and it was the ſtation whence thoſe innumerable ſwarms advanced, which, in conjunction with the Alani and other barbarous tribes, at length overran and ſubverted the weſtern empire. One part of the Gothic nation was allowed by Conſtantine to ſettle in Mœſia. Before the year 420 moſt of the Gothic nations who had ſettled within the limits of the Roman empire had been converted to the Chriſtian faith; but,

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(B) Lib. vii. page 295, B.; ibid. page 305. G. (Caſaubon). From this paſſage it appears, that the Greeks were of opinion that the Getæ were Thracians. *Plin. Nat. Hiſt.* lib. iv. cap. 11. mentions a tribe of the Getæ called *Gaudæ*.

but, unhappily, the greater part of the apoſtles by whom they had been proſelyted, were Arians, which proved fatal to many of the orthodox Chriſtians; for the Arian Goths perſecuted them with unrelenting cruelty.

216
Remains of genuine Gothic.

About the year 367, Ulphilas biſhop of the Mœſian Goths, tranſlated the New Teſtament into the Gothic language. The remains of this tranſlation furniſh a genuine, and at the ſame time venerable, monument of the ancient Gothic dialect. No more is now extant of that valuable tranſlation than the four Goſpels, and another fragment containing part of the epiſtle to the Romans. The Goſpels have been repeatedly publiſhed ſince the firſt edition by Junius 1665, down to that of Mr Lye. Other fragments of the Gothic language have alſo been found, which our curious readers may ſee in Lye's Notes to his Edition of the Gothic Goſpels. The fragment of the Epiſtle to the Romans was lately diſcovered in the library at Wolfenbuttle, and publiſhed by Knitel archdeacon of Wolfenbuttle.

The Goths, prior to the age of Ulphilas, were ignorant of the uſe of alphabetical characters. The biſhop fabricated an alphabet for them, which is a medley of Greek and Roman letters, but rather inclining to the former.

217
Gothic alphabet.

This alphabet conſiſts of 25 letters (ſee Plate XV.). Junius has carefully analyzed thoſe letters, and pointed out their powers and ſounds in his Gothic alphabet, prefixed to his *Gloſſarium Gothicum.* They were long retained in all the European languages derived from the Gothic ſource, which will be enumerated in the ſequel.

What kind of language the ancient Gothic was, is plain from the fragments above mentioned; but in what reſpects it agrees with the oriental tongues, or differs from them, is not eaſy to aſcertain with preciſion. We have obſerved in our ſection on the Greek, that a conſiderable part of that language muſt have been derived from the Thracian; which, according to Strabo there quoted, was the ſame with the Getic or Gothic. The Thracian tongue will, we are convinced upon compariſon, be found analogous to the Chaldean or Syrian. The German, which is a genuine deſcendant of the Gothic, is full of Perſian words: the old Perſian or Pahlavi appears to be a dialect of the Chaldean. The learned Junius, near the beginning of his Gothic alphabet, remarks, that a very conſiderable part of the language in queſtion is borrowed from the moſt ancient Greek.

218
Gothic language derived from the Chaldean, &c.

Both the learned Ihre in his *Gloſſarium Suio-Gothicum*, and Wachter in his excellent German and Latin Dictionary, often remark the coincidence of Gothic and German words with oriental vocables of the like ſound and of the ſame ſignification. In the old Saxon, which is another ramification of the Gothic tongue, numberleſs terms of the very ſame complexion appear. From this deduction we hope it will follow, that the Gothic tongue, in its original unmixed ſtate as it was ſpoken by the ancient Getæ, was a dialect of the primeval language; that language which the ſons of Tiras brought with them from the plains of Shinar or from Armenia, or from any other region where the primitive mortals had fixed their reſidence. To confirm this poſition, we ſhall annex a few inſtances.

The Thracian tribes, in all probability, firſt took poſſeſſion of thoſe tribes of Aſia Minor which ſtretch towards the eaſt. Thence they croſſed the Helleſpont, and ſpread themſelves far and wide northward. Strabo ſuppoſes that they firſt ſettled in the regions to the north of thoſe ſtraits, and thence tranſported numerous colonies into Aſia Minor. The reverſe was probably the caſe: but be that as it may, it is univerſally agreed, that both ſides of the Helleſpont were peopled with Thracians.

In Aſia Minor we meet with the city Perga, which, throwing away the *a*, is *Perg*. In every tongue deſcended from the Gothic, the word *Berg* ſignifies a "a rock," and metaphorically a "town or burgh;" becauſe towns were originally built on rocks for the ſake of defence. Hence likewiſe *Pergámos*, the fort or citadel of Troy. *Beira* in Thracian ſignified a "city;" the Chaldaic and Hebrew word *Beer* imports a "well," and is poſſibly the original of the Gothic word *beer*, *ale.* In ancient times, eſpecially in the Eaſt, it was cuſtomary to build cities in the neighbourhood of fountains. The ancients called the Phrygians Βρυγες, *Bryges*, or *Bruges;* the Gothic word coinciding is obvious. *Dyndymus*, the name of a city ſacred to Cybele, is compounded of two Gothic words *dun* and *dum*, both ſignifying "a height, an eminence;" and hence *a town*, *an incloſure.* The word *tros* ſeems to be the very Gothic *troſh*, "brave, valiant." The words *fader*, *mader*, *dochter*, *bruder*, are ſo obviouſly Perſian, that every etymologiſt has aſſigned them to that language.

Many futile etymologies have been given of the ſacred name *God*, which is in reality the Perſian word *Choda*, commonly applied by them to their *Hermezd* or *Oromazes.* The Perſian *bad* or *bod* ſignifies a "city;" the ſame word in Gothic imports a "houſe, a manſion, an abode." *Band*, in Perſic, a "ſtrait place;" in Gothic, "to bend." *Heim* or *ham*, "a houſe," is generally known to be of Perſian original. Much critical ſkill has been diſplayed in tracing the etymology of the Scotch and old Engliſh word *Yule*, "Chriſtmas." *Yule*, derived from *iul*, was a feſtival in honour of the ſun, which was originally celebrated at the winter ſolſtice. *Wick* or *wich* is a Gothic term ſtill preſerved in many names of towns; it ſignifies "a narrow corner, or ſmall ſtrip of land jutting into the ſea, or into a lake or river:" hence the Latin *vicus*, and Greek φοικος. In Spaniſh, we have many old Gothic words; among others *hijo* a "ſon," the ſame with the Greek ὑιος. In ſome places of Scotland, we call any thing that is little, ſmall, *wee;* originally ſpelt *wi*, if we miſtake not, from the very ſame word.

Theſe few examples we have thrown together, without any regard to order, perſuaded that almoſt every word of the language, truly Gothic, may with a little pains and judgment be traced to ſome oriental root or cognate. We may obſerve in paſſing, that many Gothic nouns end in *a*, like the Chaldaic and Syriac; that their ſubſtantive verb very much reſembles that of the Perſian, Greek, and Latin; and that their active and auxiliary verb has furniſhed the common preterperfect tenſe of Greek verbs in the active voice: that verb is *haban*, Gothic Language.

kirk, but originally *kil*, as the common people pronounce it at this day, especially in the north of Scotland, and among the Swedes, Danes, Norwegians, and Icelanders.

219 Modern tongues derived from the Gothic.

We shall now leave the other inferior arrangements of this ancient language to grammarians and lexicographers, and proceed to inquire what modern tongues are derived from it as their stock, and which of them makes the nearest approaches to its simplicity and rusticity.

We have already observed that the Goths, formerly Getæ, were possessed of a vast extent of country, reaching from the frontiers of Thrace to the banks of the river Danube. We have seen that a colony of them ſettled in Mœſia under Conſtantine II. They then ſpread themſelves into Dacia, and from thence into Germany. All theſe countries were ſituated in ſuch a manner, that the progreſs of population was forward, and according to the natural courſe of emigration. From Germany they extended themſelves into Scandinavia, that is, Sweden, Denmark, and Norway. Their whole ancient *Edda*, *Sagas*, " Chronicles," ſhow that the Goths arrived in Scandinavia by this route, without, however, fixing the era of that event with any tolerable degree of accuracy. By the Germans, we believe the ancients understood all the nations eaſtward, weſtward, and northward, reaching from the Danube on the ſouth up to the extremity of Scandinavia on the Northern ocean; and from the Rhine and German ocean on the weſt, to the river Chronus or Niemen on the eaſt. All thoſe nations ſpoke one or other of the Gothic dialects, ſome approaching nearer, and others deviating farther from, the parent language.

The Francic is a dialect of the Teutonic, *Tudeſque*, or old German; and the Goſpels of Ulphilas bear ſuch a reſemblance to the Francic, fragments of which are preſerved in the early French hiſtorians, that ſome learned men have pronounced thoſe goſpels to be part of an old Francic verſion; but others of equal reſpectability have refuted this opinion, both from hiſtory and compariſon of the dialects. Schilter has given us large monuments of the Tudeſque or old German from the ſeventh century, which evidently proye that the Gothic of Ulphilas is the same language. Wachter's learned Gloſſary of the ancient German likewiſe confirms this poſition. Mr Ihre, after heſitating whether the Goſpels of Ulphilas bear moſt reſemblance to the German or Scandinavian dialect of the Gothic, declares at laſt in favour of the former. The Anglo-Saxon is alſo proven to be a venerable dialect of the Teutonic; and is ſo intimately connected with the goſpels, that ſome valuable works on this ſubject are wholly built upon this ſuppoſition.

The Icelandic is the oldeſt relick of the Scandinavian. It begins with Arius Frode in the eleventh century, and is a dialect of the German. The remains we have of it are more modern by four centuries than thoſe of the German: they are more poliſhed than the other. The words are ſhortened, not only becauſe they are more modern than the German, but becauſe the Icelandic was poliſhed by a long ſucceſſion of poets and hiſtorians almoſt equal to thoſe of Greece and Rome. Hence the Icelandic, being a more poliſhed language than the German, has leſs affinity with the ancient Gothic. The Swediſh is more nearly related to the Icelandic than either the Daniſh or Norwegian. That the Swediſh is the daughter of the Gothic, is fully ſhown by Mr Ihre above mentioned, in his *Gloſſarium Suio-Gothicum*. There is, therefore, no reaſon of doubt as to the identity of the Gothic, preſerved in Ulphilas and other ancient remains, with the German and Scandinavian tongue.

Gothic Language.

The modern German, a language ſpoken in a far greater extent than any other of modern Europe, reſembles the Gothic more than the preſent Daniſh, Norwegian, or Swediſh, and has certainly the ancient *ſtamina*. Its likeneſs to the Aſiatic tongues, in ſtructure and inflexion as well as words of ſound, is very apparent.

Buſbequius found, that the Goths of Crim in Tartary, remains of the ancient Goths, ſpoke the pure ancient German. Theſe then were no doubt deſcendants of the ancient Goths, who remained in their native country after the others had emigrated. It is therefore apparent from the whole of this inveſtigation, that the Gothic was introduced into Europe from the Eaſt, and is probably a dialect of the language originally ſpoken by man.

§ 3. *Of the Sclavonian Language.*

220 Sclavonic language,

There is another language which pervades a conſiderable part of Europe, and this, like the Gothic, ſeems to have originated in the eaſt. The language we mean is the Sclavonic or rather Slavonic, which prevails far and wide in the eaſtern parts of this diviſion of the globe. It is ſpoken by the Dalmatians, by the inhabitants of the Danubian provinces, by the Poles, Bohemians, and Ruſſians. The word *ſlava*, that is, " ſlave" (whence the French word *eſclave*, and our word *ſlave*,), ſignifies " noble, illuſtrious;" but becauſe in the lower ages of the Roman empire, vaſt multitudes of theſe people were ſpread over all Europe in the quality of ſlaves, that word came to denote the ſervile tribe by way of diſtinction in the ſame manner as the words *Geta*, *Davus*, and *Syrus*, did among the Greeks at a more early period.

Spoken by the Slavi, one of the tribes of Sarmatians.

The Slavi dwelt originally on the banks of the Boryſthenes, now the Dnieper or Nieper. They were one of the tribes of the European Sarmatians who in ancient times inhabited an immenſe tract of country, bounded on the weſt by the Viſtula, now the Weiſſel; on the ſouth-eaſt by the Euxine, the Boſphorus Cimmerius, the Palus Mœotis, and the Tanais or Don, which divides Europe from Aſia.

In this vaſt tract of country, which at preſent comprehends Poland, Ruſſia, and a great part of Tartary, there dwelt in ancient times many conſiderable tribes. To enumerate theſe, we believe, would not much edify our readers: we ſhall only inform them, that among theſe Sarmatian clans were the Roxolani, now the Ruſſians, and likewiſe the Slavi, who dwelt near the Boryſthenes, as was obſerved above.

The Slavi gradually advanced towards the Danube; and in the reign of Juſtinian having paſſed that river, they made themſelves maſters of that part of Illyricum which lies between the Drave and the Save, and is to this day from them called *Sclavonia*. Theſe barbarians by degrees overran Dalmatia, Liburnia, the weſtern parts of Macedonia, Epirus, and at laſt they extended their quarters all along to the weſtern bank of the Danube, where that river falls into the Euxine. In all these countries, the Sclavonian was deeply impregnated with the Greek, which was a thing of course, since the barbarian invaders ſettled in thoſe regions, and mingled with the aborigines, who ſpoke a corrupt dialect of that language.

222 the Poles,

The Poles are the genuine deſcendants of the ancient Sarmatæ (c), and conſequently ſpeak a dialect of their language, but much adulterated with Latin words, in conſequence of the attachment the Polanders have long protected to the Roman tongue.

223 Sileſians, and

The Sileſians and Bohemians have corrupted their dialects in the very ſame manner. In thoſe countries, then, we are not to ſearch for the genuine remains of the ancient Sarmatian.

224 Ruſſians, deſcended from the Slavi.

The modern Ruſſians, formerly the Rhoxani or Roxolani, are the poſterity of the Sarmatæ, and are a branch of the Slavi: they inhabit a part of the country which that people poſſeſſed before they fell into the Roman provinces; they ſpeak the ſame language, and wear the very ſame dreſs; for, on the hiſtorical pillar at Conſtantinople, the Sclavonians are dreſſed like the Ruſſian boors. If then the Slavi are Sarmatæ, the Ruſſians muſt of courſe be the deſcendants of the ſame people. They were long a ſequeſtered people, and conſequently altogether unconnected with the other nations of Europe. They were ſtrangers to commerce, inhoſpitable to ſtrangers, tenacious of ancient uſages, averſe to improvements of every kind, wonderfully proud of their imaginary importance; and, in a word, a race of people just one degree above abſolute ſavagiſm. A people of this character are, for the moſt part, enemies to innovations; and if we may believe the Ruſſian hiſtorians, no nation was ever more averſe to innovations than the one in queſtion. From the ninth century, at which era they embraced Chriſtianity, it does not appear that they moved one ſtep forward towards civilization, till Peter the Great, not a century ago, in conſequence of his deſpotic authority, compelled them to adopt the manners and cuſtoms of their more poliſhed neighbours.

We may then conclude, that the Ruſſians made as little change in their language during that period, as they did in their dreſs, habits, and manner of living. Whatever language they ſpoke in the ninth century, the ſame they employed at the beginning of the 18th. They were, indeed, according to *Appian de bel. Mithrid.* once conquered by Diophantus, one of Mithridates's generals, but that conqueſt was for a moment only: they were likewiſe invaded, and their country overrun, by the great Timor or Tamerlane; but this invaſion was like a torrent from the mountains, which ſpreads devaſtation far and wide while it rages, but makes little alteration on the face of the country.

We find likewiſe, that upon ſome occaſions they made incurſions upon the frontiers of the Roman empire; but we hear of no permanent ſettlements formed by them in theſe quarters. Upon the whole, we take the Ruſſians to have been, with reſpect to their language, in the very ſame predicament with the highlanders and iſlanders of Scotland, who, according to the general opinion, have preſerved the Celtic dialect pure and entire, in conſequence of their having never mingled with foreigners.

225 The Ruſſian language genuine Sclavonic.

From this deduction we may infer two things; firſt, that the Ruſſian language is the genuine Sclavonian; and, ſecondly, that the latter is the ſame, or nearly the ſame, with the ancient Sarmatian.

In the Ruſſian, there are found a great number of words reſembling the old ſimple roots of the Greek both in ſound and ſignification; its grammatical genius is nearly the ſame; and we are informed by the very beſt authority, that there is in this language a tranſlation of Epictetus, in which there are whole pages, in both original and tranſlation, without one ſingle tranſpoſition. Monſ. Leveque, who has publiſhed a tranſlation of a hiſtory of Ruſſia, is ſo entirely convinced of the ſtrict analogy between the ancient Greek and the modern Ruſſe, that he is poſitive that the former is derived from the latter. Monſ. Freret, a very learned French academician, is clearly of the ſame opinion. We are, however, perſuaded that this opinion is ill founded. We rather imagine, that thoſe coincidences ariſe from the relicks of the primitive language of mankind; veſtiges of which, we believe, are to be found almoſt in every tongue now exiſting.

It is, however, we allow, uncommonly difficult to render a reaſon for the ſyntaxical analogy of the two languages, without admitting the truth of the one or the other hypotheſis. We have examined with ſome care a good number of Ruſſian vocables, and compared them with Greek ones of the ſame ſignification. We have not, however, found ſuch a reſemblance as we think neceſſary to ſupport the poſition advanced above.

226 Reſemblance between Ruſſian and oriental words.

We have indeed found a very ſtrong reſemblance between the former and many oriental words, eſpecially Hebrew, Chaldean, and old Perſian, of which we could produce ſeveral inſtances, did the nature of our preſent inquiry admit ſuch a deviation. Every body knows that the Sarmatæ were divided into two great nations, the Aſiatic and European; the former extended very far eaſtward, behind the mountain Caucaſus, the northern ſhore of the Euxine ſea, and ſo forth. Theſe, we may believe, derived their language from the original tongue long before the Greek language exiſted. This, in compariſon of the Hebrew, Phœnician, Egyptian, Arabian, Chaldean, &c. was but of yeſterday. The Greek, moſt learned men are now convinced, was a late compoſition of many different dialects, incorporated with the jargon of the aboriginal Ionim or Greeks. The Sarmatian, on the contrary, was the tongue of a great and populous nation, civilized, in all appearance, long before the Greeks began to emerge from a ſtate of ſavagiſm. We are, therefore, by no means diſpoſed to allow, either that the Greek is derived from the Ruſſian, or the Ruſſian from the Greek. We believe there is juſt the ſame reaſon for this concluſion, that the Abbé Pezron and Monſ. Gebelin pretend to have diſcovered, in order to ſupport their poſition that the Greek is derived from the Celtic. Certain it is, that the reſemblance among the oriental languages, of which we ſuppoſe the Sarmatian to have been one, is ſo palpable, that any perſon of a moderate capacity who is perfectly maſter of one, will find little difficulty in acquiring any other. If, therefore, the coincidence between the Greek and Ruſſian ſhould actually exiſt, we think this circumſtance will not authenticate the ſuppoſition, that either of the two is derived from the other.

(c) This appears by their character, their laws, their manners, their form of government, their military equipage, their impetuoſity, their ariſtocratic ſplendor.

In the courſe of this argument, our readers will be pleaſed to obſerve, that we all along ſuppoſe, that the Sclavonian, of which we think the Ruſſian is the moſt genuine remain, is the ſame with the old Sarmatian. We ſhall now take the liberty to hazard a conjecture with reſpect to the ſyntaxical coincidence of that language with the Greek; for we acknowledge that we are not ſo profoundly verſed in the Ruſſian dialect of the Sclavonian as to pretend to pronounce a definitive ſentence.

As the Ruſſians were a generation of ſavages, there is no probability that they were acquainted with the uſe of letters and alphabetical writing till they acquired that art by intercourſe with their neighbours. It is certain, beyond all contradiction, that few nations had made leſs proficiency in the fine arts than that under conſideration: and we think there is little appearance of their having learned this art prior to their converſion to Chriſtianity. Certain it is, that the Slavi, who ſettled in Dalmatia, Illyria, and Liburnia, had no alphabetical characters till they were furniſhed with them by St Jerome. The Servian character, which very nearly reſembles the Greek, was invented by St Cyril; on which account the language written in that character is denominated *Chiurilizza*. Theſe Sclavonic tribes knew nothing of alphabetic writing prior to the era of their converſion. The Mœſian Goths were in the ſame condition till their biſhop Ulphilas fabricated them a ſet of letters.

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Origin of the ſyntaxical coincidence between this language and the Greek.

If the Slavi and Goths, who reſided in the neighbourhood of the Greeks and Romans, had not learned alphabetical writing prior to the era of their converſion to Chriſtianity, it muſt hold, *à fortiori*, that the Ruſſians, who lived at a very great diſtance from thoſe nations, knew nothing of this uſeful art antecedent to the period of their embracing the Chriſtian faith.

The Ruſſians pretend that they were converted by St Andrew; but this is known to be a fable. Chriſtianity was firſt introduced among them in the reign of the grand duke Wolodimar, who marrying the daughter of the Grecian emperor Baſilius, became her convert about the year 989. About this period, we imagine, they were taught the knowledge of letters by the Grecian miſſionaries, who were employed in teaching them the elements of the Chriſtian doctrines. Their alphabet conſiſts of 31 letters, with a few obſolete additional ones; and theſe characters reſemble thoſe of the Greeks ſo exactly, that there can be no doubt of their being copied from them. It is true, the ſhape of ſome has been ſomewhat altered, and a few barbarian ones have been intermingled. The Ruſſian liturgy, every body knows, was copied from that of the Greeks; and the beſt ſpecimen of the old Ruſſian is the church offices for Eaſter, in the very words of Chryſoſtom, who is called by his name *Zlato uſtii*, "golden-mouthed." The power of the clergy in Ruſſia was exceſſive; and no doubt their influence was proportioned to their power. The firſt race of clergy in that country were undoubtedly Greeks. We know how active and induſtrious thoſe people were in propagating their language as well as their religion. The offices of religion might be at firſt written and pronounced in the Greek tongue, but it would ſoon be found expedient to have them tranſlated into Ruſſian. The perſons employed in this work muſt have been Greeks, who underſtood both languages.

As it is confeſſedly impoſſible that a people ſo dull and uninventive as the Ruſſians originally were, could ever have fabricated a language ſo artificially conſtructed as their preſent dialect; and as it is obvious, that, till Chriſtianity was introduced among them by the Greeks, they could have no correſpondence with that people—it muſt appear ſurpriſing by what means their language came to be faſhioned ſo exactly according to the Greek model. We have obſerved above, that the Ruſſian letters muſt have been invented and introduced into that country by the Greek miſſionaries. We think it probable, that thoſe apoſtles, at the ſame time that they taught them a new religion, likewiſe introduced a change into the idiom of their language. The influence of thoſe ghoſtly teachers over a nation of ſavages muſt have been almoſt boundleſs; the force of their precepts and example almoſt incontrollable. If the ſavage converts accepted a new religion from the hands of thoſe Grecian apoſtles, they might with equal ſubmiſſion adopt improvements in their language. Such of the natives as were admitted to the ſacerdotal function muſt have learned the Greek language, in order to qualify them for performing the offices of their religion. A predilection for that language would be the immediate conſequence. Hence the natives, who had been admitted into holy orders, would co-operate with their Grecian maſters in improving the dialect of the country; which, prior to the period above mentioned, muſt have greatly deviated from the original ſtandard of the Sarmatian tongue.

Upon this occaſion, we imagine the Greek apoſtles, in conjunction with their Ruſſian diſciples, reduced the language of the country to a reſemblance with the Greek idiom. They retained the radical vocables as they found them; but by a variety of flexions, conjugations, derivations, compoſitions, and other modifications, transformed them into the Grecian air and apparel. They muſt have begun with the offices of the church; and among a nation of ſavages newly converted, the language of the new religion would quickly obtain a very extenſive circulation. When the Grecian garniture was introduced into the church, the laity would in proceſs of time aſſume a ſimilar dreſs. The fabric of the Grecian declenſions, conjugations, &c. might be grafted upon Ruſſian ſtocks without affecting the radical parts of the language. If the dialect in queſtion, like moſt others of a very ancient date, laboured under a penury of vocables, this manœuvre would contribute exceedingly to ſupply that defect. By this expedient the Greek language itſelf had been enlarged from about 300 radical terms to the prodigious number of words of which it now conſiſts.

The Latin tongue we have ſeen above in its original conſtitution differed widely from the Greek; and notwithſtanding this incongruity, the improvers of the former have preſſed it into a very ſtrict agreement with the latter.

Sclavonian Language.

latter. This, we think, was ſtill a more difficult taſk; as, in our opinion, the genius of the Latin differs in a much greater degree from that of the Ruſſian does from the Greek. We know, that the genius of the Gothic tongue and those of all its deſcendants are much more in uniſon with the Greek than with that of the Latin. The Engliſh, Italian, and French, have cudgelled many of their Gothic, Teutonic, and Celtic verbs, into a kind of conjugations, imitating or rather aping thoſe of the Latin. The Perſians have formed moſt elegant and energetic declenſions and conjugations, upon inflexible roots, borrowed from the Pahlavi and Deri, and even from Tartar originals.

Upon the grounds above-mentioned we have taken the liberty to hazard the following conjectures, which we cheerfully ſubmit to the cognizance of our more enlightened readers.

1. That the Sarmatian was a dialect of the original language of mankind.

2. That the Sclavonian was a dialect of the Sarmatian.

3. That the Ruſſe is the moſt genuine unſophiſticated relick of the Sclavonian and Sarmatian.

4. That the Ruſſians had no alphabetic characters prior to the era of the introduction of Chriſtianity, that is, towards the end of the tenth century.

5. That they were converted by Grecian miſſionaries.

6. That thoſe miſſionaries copied their preſent letters from thoſe of Greece; and in conjunction with the more enlightened natives, reduced the original unimproved Ruſſe to its preſent reſemblance to the Greek ſtandard.

228 Ruſſian nouns.

The Ruſſian language, like moſt others, contains eight parts of ſpeech, noun, pronoun, &c. Its nouns have three genders, maſculine, feminine, and neuter; it has alſo a common gender for nouns, intimating both ſexes. It has only two numbers, ſingular and plural. Its caſes are ſeven, nominative, genitive, dative, accuſative, vocative, inſtrumental, and prepoſitive. Theſe caſes are not formed by varying the termination, as in Greek and Latin; but generally by placing a vowel after the word, as, we imagine, was the original practice of the Greeks (See *Greek* Section). Thus in Ruſſe, ϱυκ, *ruk*, "the hand;" nominative, ϱυκ-α, "the hand;" genitive, ϱυκ-Ν` "of the hand," &c. See *Les Elem. de la Langue Ruſſe par Charpentier*. Nouns ſubſtantive are

229 Adjectives.

reduced to four declenſions, and adjectives make a fifth. Theſe agree with their ſubſtantives in caſe, gender, and number. They have three degrees of compariſon, as is common in other languages; the poſitive, comparative, and ſuperlative. The comparative is formed from the feminine of the nominative ſingular of the poſitive, by changing *a* into *te*, that is, *aie* in Engliſh; the ſuperlative is made by prefixing πϱε, *pre*, before the poſitive. Theſe rules are general; for the exceptions, recourſe muſt be had to the Ruſſian grammar above-mentioned.

The numeral adjectives in Ruſſe have three genders like the reſt, and are declined accordingly. Their pronouns have nothing peculiar, and are divided and arranged in the ſame manner as in other languages. Verbs

230 Verbs.

in the Ruſſian language are comprehended under two conjugations. The moods are only three; the indicative, the imperative, and the infinitive: the ſubjunctive is formed by placing a particle before the indicative. Its tenſes are eight in number; the preſent, the imperfect, the preterite ſimple, the preterite compound, the pluperfect, the future indeterminate, the future ſimple, the future compound. The verbs have their numbers and perſons as in other languages. To enter into a detail of their manner of conjugating their verbs would neither be conſiſtent with our plan, nor, we are perſuaded, of much conſequence to our readers. Their other parts of ſpeech differ nothing from thoſe of other languages. Their ſyntax nearly reſembles that of the Greek and Latin. All theſe articles muſt be learned from a grammar of the language. Whether there is any grammar of the Ruſſian language compoſed in Engliſh we know not. That of Monſ. Charpentier in French, printed at Peterſburgh in 1768, is the only one we have ſeen, and which appears to us a very excellent one. We could wiſh to be able to gratify our readers with a more authentic account of the origin of the Sclavonian language; but this we find impoſſible, in conſequence of the want of memorials relating to the ſtate of the ancient Sarmatæ. Towards the era of the ſubverſion of the weſtern empire, the nations who inhabited the countries in queſtion were ſo blended and confounded with each other, and with Huns and other Scythian or Tartar emigrants, that we believe the moſt acute antiquarian would find it impoſſible to inveſtigate their reſpective tongues, or even their original reſidence or extraction. We have ſelected the Ruſſe as the moſt genuine branch of the old Sclavonian, and to this predilection we were determined by the reaſons above mentioned. We are ſorry that we are not ſo well acquainted with the idiom of the Ruſſian language as to be able to compare it with thoſe of the eaſt; but upon ſuch a compariſon, we are perſuaded that the radical materials of which it is compoſed would be found to have originated in the oriental regions. The word *Tſar*, for example, is probably the Phœnician and Chaldean *Sar*, or *Zar*, "a prince, a grandee." Diodorus Siculus calls the queen of the Maſſagetæ, who, according to Cteſias, cut off Cyrus's head, *Zarina;* which was not many years ago the general title of the empreſs of all the Ruſſias. Herodotus calls the ſame princeſs *Tomyris*, which is the very name of the famous Timor or Tamur, the conqueror of Aſia. The former ſeems to have been the title, and the latter the proper name, of the queen of the Maſſagetæ. In the old Perſian or Pahlavi, the word *Gard* ſignifies "a city;" in Ruſſian, *Gorad* or *Grad* intimates the very ſame idea: hence *Conſtantinople* in old Ruſſe is called *Tſargrad* or *Tſargorad*. Theſe are adduced as a ſpecimen only; and able etymologiſts might, we believe, diſcover a great number.

231 Phœnician and Chaldean words in Ruſſe.

The Sclavonian language is ſpoken in Epirus, the weſtern part of Macedonia, in Boſnia, Servia, Bulgaria, in part of Thrace, in Dalmatia, Croatia, in Poland, Bohemia, Ruſſia, and Mingrelia in Aſia, whence it is frequently uſed in the ſeraglio at Conſtantinople. Many of the great men of Turkey underſtand it, and frequently uſe it; and moſt of the janizaries having been ſtationed in garriſons on the Turkiſh frontiers in Europe, uſe it as their vulgar tongue. The Hungarians, however, and the natives of Wallachia, ſpeak a different language: and this language bears evident ſignatures of the Tartarian dialect, which was the tongue of the orinal Huns. Upon the whole, the Sclavonian is by much the moſt extenſive language in Europe, and extends far into Aſia.

Modern Languages.

Sect. X. *Modern Languages.*

If we call all the different dialects of the various nations that now inhabit the earth, languages, the number is truly great: and vain would be the [illegible] who [illegible] attempt to learn them, though but imperfectly. We shall begin with naming the principal of them. There are four, which may be called original or mother-languages, and which ſeem to have given birth to all that are now ſpoken in Europe. Theſe are the *Latin*, *Celtic*, *Gothic*, and *Sclavonian*. It will not, however, be imagined, from the term *original* given to theſe languages, that we believe them to have come down to us, without any alteration, from the confuſion of tongues at the building of the tower of Babel. We have repeatedly declared our opinion, that there is but one truly original language, from which all others are derivatives variouſly modified. The four languages juſt mentioned are [illegible] the immediate parents of thoſe which are now ſpoken in Europe.

232 [illegible]

I. From the *Latin* came,

1. The Portugueſe.
2. Spaniſh.
3. French.
4. Italian.

From the *Celtic*,

5. The Erſe, or Gaelic of the Highlands of Scotland.
6. The Welſh.
7. The Iriſh.
8. Baſſe-Bretagne.

From the *Gothic*,

9. The German.
10. The Low Saxon or Low German.
11. The Dutch.
12. The Engliſh, in which almoſt all the noun-ſubſtantives are German, and many of the verbs French, Latin, &c. and which is enriched with the ſpoils of all other languages.
13. The Daniſh.
14. The Norwegian.
15. Swediſh.
16. Icelandic.

From the *Sclavonian*,

17. The Poloneſe.
18. The Lithuanian.
19. Bohemian.
20. [illegible]
21. Moravian.
22. The modern Vandalian, as it is ſtill ſpoken in Luſatia, Pruſſian Vandalia, &c.
23. The Croatian.
24. The Ruſſian or Muſcovite; which, as we have ſeen, is the pureſt dialect of this language.
25. The language of the Calmucs and Coſſacs.
26. Thirty-two different dialects of nations who inhabit the north-eaſtern parts of Europe and Aſia, and who are deſcended from the Tartars and Huno-Scythians. There are polyglott tables which contain not only the alphabets, but alſo the principal diſtinct characters of all theſe languages.

233 [illegible]

II. The languages at preſent generally ſpoken in Aſia, [illegible]

27. The Turkiſh and Tartarian, with their different dialects.
28. The Perſian.
29. The Georgian or Iberian.
30. The Albanian or Circaſſian.
31. The Armenian.
32. The modern Indian.
33. The Formoſan.
34. The [illegible].
35. The Malabarian.
36. The [illegible].
37. The Tamulic or Damulic.
38. The modern Arabic.
39. The [illegible].
40. The Mungalic.
41. The language of the [illegible]
42. The Gruſinic or Gruſinian.
43. The Chineſe.
44. The [illegible].

[illegible]

[illegible]

We have enumerated here thoſe Aſiatic languages only of which we have ſome knowledge in Europe, and [illegible] alphabets, grammars, or other books that [illegible] us information concerning them. There are doubtleſs other tongues and dialects in thoſe vaſt regions and adjacent iſlands; but of theſe we are not able to give any account.

234 African languages.

III. The principal languages of Africa are,

45. The modern Egyptian.
46. The Fetuitic, or the language of the kingdom of Fetu.
47. The Moroccan; and,
48. The jargons of thoſe ſavage nations who inhabit the deſert and burning regions. The people on the coaſt of Barbary ſpeak a corrupt dialect of the Arabic. To theſe may be added the Chilhic language, otherwiſe called *Tamazeght*; the Nigritian, and that of Guinea; the Abyſſinian; and the language of the Hottentots.

235 American languages.

IV. The languages of the American nations are but little known in Europe. Every one of theſe, though diſtant but a few days journey from each other, have their particular language or rather jargon. The languages of the Mexicans and Peruvians ſeem to be the moſt regular and poliſhed. There is alſo one called *Poconchi* or *Pocomana*, that is uſed in the bay of Honduras and towards Guatimal. the words and rules of which are moſt known to us. The languages of North America are in general the Algonhic, Apalachian, Mohogic, Savanahamic, Virginic, and Mexican: and in South America, the Peruvian, Caribic, the language of Chili, the Cairic, the Tucumanian, and the languages uſed in Paraguay, Braſil, and Guiana.

236 General re[illegible]

V. We have already ſaid, that it would be a vain and [illegible] undertaking for a man of letters to attempt the ſtudy of all theſe languages, and to make his head a univerſal dictionary; but it would be [illegible] to attempt the analyſis of [illegible]. Some general reflections [illegible]. Among the modern languages of Europe, the French ſeems to merit great attention; as it is [illegible] and pleaſing in itſelf; as it is become ſo general, that with it we may travel from one end of Europe to the other

[illegible]

without ſcarce having any occaſion for an interpreter; and as in it are to be found excellent works of every kind, both in verſe and proſe, uſeful and agreeable. There are, beſides, grammars and dictionaries of this language which give us every information concerning it, and very able maſters who teach it; eſpecially ſuch as come from thoſe parts of France where it is ſpoken correctly; for with all its advantages, the French language has this inconvenience, that it is pronounced ſcarce anywhere purely but at Paris and on the banks of the Loire. The language of the court, of the great world, and of men of letters, is moreover very different from that of the common people; and the French tongue, in general, is ſubject to great alteration and novelty. What pity it is, that the ſtyle of the great Corneille, and that of Moliere, ſhould already begin to be obſolete, and that it will be but a little time before the inimitable *chefs d'œuvres* of thoſe men of ſublime genius will be no longer ſeen on the ſtage: The moſt modern ſtyle of the French, moreover, does not ſeem to be the beſt. We are inclined to think, that too much conciſeneſs, the epigrammatic point, the antitheſis, the paradox, the ſententious expreſſion, &c. diminiſh its force; and that, by becoming more poliſhed and refined, it loſes much of its energy.

VI. The German and Italian languages merit likewiſe a particular application; as does the Engliſh, perhaps above all, for its many and great excellencies (See LANGUAGE). Authors of great ability daily labour in improving them; and what language would not become excellent, were men of exalted talents to make conſtant uſe of it in their works! If we had in Iroquois books like thoſe which we have in Engliſh, Italian, French, and German, ſhould we not be tempted to learn that language? How glad ſhould we be to underſtand the Spaniſh tongue, though it were only to read the Araucana of Don Alonzo D'Ercilia, Don Quixote, ſome dramatic pieces, and a ſmall number of other Spaniſh works, in the original; or the poem of Camoens in Portugueſe.

VII. The other languages of Europe have each their beauties and excellencies. But the greateſt difficulty in all living languages conſtantly conſiſts in the pronunciation, which it is ſcarce poſſible for any one to attain unleſs he be born or educated in the country where it is ſpoken: and this is the only article for which a maſter is neceſſary, as it cannot be learned but by teaching or by converſation: all the reſt may be acquired by a good grammar and other books. In all languages whatever, the poetic ſtyle is more difficult than the proſaic: in every language we ſhould endeavour to enrich our memories with great ſtore of words (*copia verborum*), and to have them ready to produce on all occaſions: in all languages it is difficult to extend our knowledge ſo far as to be able to form a critical judgement of them. All living languages are pronounced rapidly, and without dwelling on the long ſyllables (which the grammarians call *moram*): almoſt all of them have articles which diſtinguiſh the genders.

VIII. Thoſe languages that are derived from the Latin have this further advantage, that they adopt without reſtraint, and without offending the ear, Latin and Greek words and expreſſions, and which by the aid of a new termination appear to be natives of the language. This privilege is forbidden the Germans, who in their beſt tranſlations dare not uſe any foreign word, unleſs it be ſome technical terms in caſe of great neceſſity.

PHI

PHI

PHILOMATHES, a lover of learning or ſcience.

PHILOMELA, in fabulous hiſtory, was a daughter of Pandion king of Athens, and ſiſter to Procne, who had married Tereus king of Thrace. Procne ſeparated from Philomela, to whom ſhe was much attached, ſpent her time in great melancholy till ſhe prevailed upon her huſband to go to Athens and bring her ſiſter to Thrace. Tereus obeyed; but he had no ſooner obtained Pandion's permiſſion to conduct Philomela to Thrace, than he fell in love with her, and reſolved to gratify his paſſion. He diſmiſſed the guards whom the ſuſpicions of Pandion had appointed to watch him; offered violence to Philomela; and afterwards cut out her tongue, that ſhe might not diſcover his barbarity, and the indignities ſhe had ſuffered. He confined her in a lonely caſtle; and having taken every precaution to prevent a diſcovery, he returned to Thrace, and told Procne that Philomela had died by the way, and that he had paid the laſt offices to her remains. At this ſad intelligence Procne put on mourning for the loſs of Philomela; but a year had ſcarcely elapſed before ſhe was ſecretly informed that her ſiſter was not dead. Philomela, in her captivity, deſcribed on a piece of tapeſtry her misfortunes and the brutality of Tereus, and privately conveyed it to Procne. She was going to celebrate the orgies of Bacchus when ſhe received it, but ſhe diſguiſed her reſentment; and as during thoſe feſtivals ſhe was permitted to rove about the country, ſhe haſtened to deliver her ſiſter Philomela from her confinement, and concerted with her on the beſt meaſures of puniſhing the cruelty of Tereus. She murdered her ſon Itylus, then in the ſixth year of his age, and ſerved him up as food before her huſband during the feſtival. Tereus, in the midſt of his repaſt, called for Itylus; but Procne immediately informed him that he was then feaſting on his fleſh, when Philomela, by throwing on the table the head of Itylus, convinced the monarch of the cruelty of the ſcene. He drew his ſword to puniſh Procne and Philomela; but as he was going to ſtab them to the heart, he was changed into a hoopoe, Philomela into a nightingale, Procne into a ſwallow, and Itylus into a pheaſant. This tragedy happened at Daulis in Phocis; but Pauſanias and Strabo, who mention the whole of the ſtory, are ſilent about the transformation; and the former obſerves, that Tereus, after this bloody repaſt, fled to Megara, where he laid violent hands on himſelf. The inhabitants of the place raiſed a monument to his memory, where they offered yearly ſacrifices, and placed ſmall pebbles inſtead of barley. It was on this monument that the birds called hoopoes were firſt ſeen; hence the fable of his metamorphoſis. Procne and Philomela died through exceſſive grief and melancholy; and as the nightingale's and the ſwallow's voice is peculiarly plaintive and mournful, the poets have embelliſhed the fable by ſuppoſing that the two unfortunate ſiſters were changed into birds.

PHILONIUM, in *Pharmacy*, a kind of anodyne opiate, taking its name from Philo the inventor.

Ancient Univerſal Hiſtory, vol. vi.

PHILOPOEMEN, a celebrated general of the Achæan league, was born in Megalopolis, a city of Arcadia, in Peloponneſus; and from his very infancy diſcovered a ſtrong inclination to the profeſſion of arms. He was nobly educated by Caſſander of Mantinea; a man of great probity, and uncommon abilities. He was no ſooner able to bear arms than he entered among the troops which the city of Megalopolis ſent to make incurſions into Laconia, and in theſe inroads never failed to give ſome remarkable inſtance of his prudence and valour. When there were no troops in the field, he uſed to employ his leiſure time in hunting and ſuch other manly exerciſes. When Cleomenes king of Sparta attacked Megalopolis, Philopœmen diſplayed much courage and greatneſs of ſoul. He ſignalized himſelf no leſs ſome time after, in the battle of Sellaſia, where Antigonus gained a complete victory over Cleomenes. Antigonus, who had been an eye-witneſs of his prudent and intrepid behaviour, made very advantageous offers to gain him over to his intereſt; but he rejected them, having an utter averſion to a court life, which he compared to that of a ſlave, ſaying, that a courtier was but a ſlave of a better condition. As he could not live idle and inactive, he went to the iſle of Crete, which was then engaged in war, and ſerved there as a volunteer till he acquired a complete knowledge of the military art; for the inhabitants of that iſland were in thoſe days accounted excellent warriors, being ſcarce ever at peace among themſelves. Philopœmen, having ſerved ſome years among the troops of that iſland, returned home, and was upon his arrival appointed general of the horſe; in which command he behaved ſo well, that the Achæan horſe, heretofore of no reputation, became in a ſhort time famous all over Greece. He was ſoon after appointed general of all the Achæan forces, when he applied himſelf to the re-eſtabliſhing of military diſcipline among the troops of the republic, which he found in a very low condition, and univerſally deſpiſed by their neighbours. Aratus, indeed, was the firſt that raiſed the Achæan ſtate to that pitch of power and glory to which it arrived; but the ſucceſs of his enterpriſes was not ſo much owing to his courage and intrepidity as to his prudence and politics. As he depended on the friendſhip of foreign princes, and their powerful ſuccours, he neglected the military diſcipline at home; but the inſtant Philopœmen was created prætor, or commander in chief, he rouſed the courage of his countrymen, in order to put them into a condition to defend themſelves without the aſſiſtance of foreign allies. With this view he made great improvements in the Achæan diſcipline; changing the manner of their exerciſe and their arms, which were both very defective. He had thus, for the ſpace of eight months, exerciſed his troops every day, making them perform all the motions and evolutions, and accuſtoming them to manage with dexterity their arms, when news was brought him that Machanidas was advancing, at the head of a numerous army, to invade Achaia. He was glad of this opportunity to try how the troops had profited by his diſcipline; and accordingly, taking the field, met the enemy in the territories of Mantinea, where a battle was fought. Philopœmen, having killed Machanidas with his own hand, ſtruck off his head, and carried it from rank to rank, to encourage his victorious Achæans, who continued the purſuit, with great ſlaughter, and incredible ardour, to the city of Tegea, which they entered together with the fugitives. The Lacedæmonians loſt on this occaſion above 8000 men, of which 4000 were killed on the ſpot, and as many taken priſoners. The loſs of the Achæans was very inconſiderable, and thoſe that fell were moſtly mercenaries. This happened about the year before Chriſt 204.

But what moſt of all raiſed the fame and reputation of Philopœmen was his joining the powerful city of Lacedæmon to the Achæan commonwealth; by which means the Achæans came to eclipſe all the other ſtates of Greece. This memorable event happened in the year 191. In this tranſaction we cannot help taking notice of one circumſtance, which, in our opinion, reflects greater luſtre on Philopœmen than all his warlike exploits. The Lacedæmonians, overjoyed to ſee themſelves delivered from the oppreſſions they had long groaned under, ordered the palace and furniture of Nabis to be ſold; and the ſum accruing from thence, to the amount of 120 talents, to be preſented to Philopœmen, as a token of their gratitude. Deputies therefore were to be appointed, who ſhould carry the money, and deſire Philopœmen, in the name of the ſenate, to accept of the preſent. On this occaſion it was that the virtue of the generous Achæan appeared in its greateſt luſtre; for ſo great was the opinion which the Spartans had of his probity and diſintereſtedneſs, that no one could be found who would take upon him to offer the preſent: ſtruck with veneration, and fear of diſpleaſing him, they all begged to be excuſed. At laſt they obliged, by a public decree, one Timolaus, who had formerly been his gueſt, to go to Megalopolis, where Philopœmen lived, and offer him this teſtimony of their regard. Timolaus, with great reluctance, ſet out for Megalopolis, where he was kindly received and entertained by Philopœmen. Here he had an opportunity of obſerving the ſtrictneſs of his whole conduct, the greatneſs of his mind, the frugality of his life, and the regularity of his manners; which ſtruck him with ſuch awe, that he did not dare once to mention the preſent he was come to offer; inſomuch that, giving ſome other pretence to his journey, he returned home with the money. The Lacedæmonians ſent him again; but he could no more prevail upon himſelf now than the firſt time to mention the true cauſe of his journey. At laſt, going a third time, he ventured, with the utmoſt reluctance, to acquaint Philopœmen with the offer he had to make in the name of the Lacedæmonians. Philopœmen heard him with great calmneſs; but the inſtant he had done ſpeaking, he ſet out with him for Sparta, where, after having acknowledged his obligation to the Spartans, he adviſed them to lay out their money in reforming or purchaſing thoſe miſcreants who divided the citizens, and ſet them at variance by means of their ſeditious diſcourſes; to the end that, being paid for their ſilence, they might not occaſion ſo many diſtractions in the government: " for it is much more adviſable (ſaid he) to ſtop an enemy's mouth than a friend's; as for me, I ſhall always be your friend, and

you

Philopœmen. Philoſopher's Stone.

you ſhall reap the benefit of my friendſhip without expence." Such was the diſintereſtedneſs of this noble Achean!

About two years after this, the city of Meſſene withdrew itſelf from the Achean league. Philopœmen attacked them; but was wounded, taken priſoner, and poiſoned by the magiſtrates. Thus died one of the greateſt heroes that Greece or any other country ever produced. He was no way inferior in valour, military knowledge, and virtue, to any of the boaſted heroes of Rome. Had Achaia been nearer to an equality with Rome, he would have preſerved his country from the yoke which the Roman republic forced it to bear. Both the Greek and Roman writers put him upon the level with Hannibal and Scipio, who were his contemporaries, and happened to die the ſame year. They allow him to have been not only one of the greateſt commanders, but alſo one of the greateſt ſtateſmen of his age. To his valour and prudence Achaia owed her glory, which upon his death began to decline, there being none after him in that republic able to oppoſe her enemies with the like ſteadineſs and prudence: whence Philopœmen was called the laſt of the Greeks, as Brutus was afterwards ſtyled the laſt of the Romans.

PHILOSOPHER, a perſon verſed in philoſophy; or one who makes profeſſion of, or applies himſelf to, the ſtudy of nature.

PHILOSOPHER'S Stone, the greateſt object of alchemy, is a long ſought for preparation, which, when found, is to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines or perfected by the refiner's art.

Some Greek writers in the fourth and fifth centuries ſpeak of this art as being then known; and towards the end of the 13th century, when the learning of the Eaſt had been brought hither by the Arabians, the ſame pretenſions began to ſpread through Europe. It is ſuppoſed that this art, called *alchemy*, was of Egyptian origin; and that, when the ancient Greek philoſophers travelled into Egypt, they brought back ſome of the allegoric language of this Egyptian art, ill underſtood, which afterwards paſſed into their mythology. Alchemy was the earlieſt branch of chemiſtry, conſidered as a philoſophical ſcience: in the other parts of chemical knowledge, facts preceded reaſoning or ſpeculation; but alchemy was originally ſpeculative.

The alchemiſts ſuppoſed the general principles of metals to be chiefly two ſubſtances, which they called mercury and ſulphur; they apprehended alſo, that the pure mercurial, ſulphureous, or other principles of which they imagined gold to be compoſed, were contained ſeparately in other bodies: and theſe principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digeſtions; and by thus conjoining the principles of gold, if they could be ſo produced and conjoined, it might be expected that gold would be produced. But the alchemiſts pretend to a product of a higher order, called *the elixir*, *the medicine for metals*, *the tincture*, *the philoſopher's ſtone*; which by being projected on a large quantity of any of the inferior metals in fuſion, ſhould change them into fine gold; which being laid on a plate of ſilver, copper, or iron, and moderately heated, ſhould ſink into the metal, and change into gold all the parts to which it was applied; which, on being properly heated with pure gold, ſhould change the gold into a ſubſtance of the ſame nature and virtue with itſelf, ſo as thus to be ſuſceptible of perpetual multiplication; and which, by continued coction, ſhould have its power more and more exalted, ſo as to be able to tranſmute greater and greater quantities of the inferior metals, according to its different degrees of perfection.

Alchemiſts have attempted to arrive at the making of gold by three methods: the firſt by ſeparation; for every metal yet known, it is affirmed, contains ſome quantity of gold; only, in moſt, the quantity is ſo little as not to defray the expence of getting it out.

The ſecond is by maturation; for the alchemiſts think mercury is the baſis and matter of all metals; that quickſilver purged from all heterogeneous bodies would be much heavier, denſer, and ſimpler, than the native quickſilver; and that by ſubtilizing, purifying, and digeſting it with much labour, and long operations, it is poſſible to convert it into pure gold.

This method is only for mercury. With reſpect to the other metals, it is ineffectual, 1. Becauſe their matter is not pure mercury, but has other heterogeneous bodies adhering to it; and, 2. Becauſe the digeſtion, whereby mercury is turned into gold, would not ſucceed in other metals, becauſe they had not been long enough in the mines.

Weight is the inimitable character of gold, &c. Now mercury, they ſay, has always ſome impurities in it, and theſe are lighter than mercury. Could they be purged away, which they think is not impoſſible, mercury would be as heavy as gold, and what is as heavy as gold is gold, or at leaſt might very eaſily be made gold.

The third method is by tranſmutation, or by turning all metals readily into pure gold, by melting them in the fire, and caſting a little quantity of a certain preparation into the fuſed matter; upon which the fæces retire, are volatilized and burnt, and carried off, and, the reſt of the maſs is turned into pure gold. That which works this change in the metals is called the *philoſopher's ſtone*.

Whether this third method be poſſible or not, it is difficult to ſay. We have ſo many teſtimonies of it from perſons who on all other occaſions ſpeak truth, that it is hard to ſay they are guilty of direct falſehood, even when they ſay that they have been maſters of the ſecret. We are told, that it is only doing that by art which nature does in many years and ages. For as lead and gold differ but little in weight, therefore there is not much in lead beſide mercury and gold. Now, if we had any body which would ſo agitate all the parts of lead as to burn all that is not mercury therein, and had alſo ſome ſulphur to fix the mercury, would not the maſs remaining be converted into gold? There is nothing in nature ſo heavy as lead except gold, mercury, and platina, which was not known to theſe reaſoners; it is evident, threfore, there is ſomething in lead that comes very near to gold. But in lead there is likewiſe ſome heterogenous matter different both from mercury and gold. If therefore 19 ounces of lead be diſſolved by the fire, and 8 ounces be deſtroyed by theſe means, it is argued that we ſhall have the reſt good gold; the ratio of lead to gold being as 11 to 19. If then the philoſopher's ſtone can purify the mercurial matter in lead, ſo as that nothing ſhall remain but the pure mercurial body, and you can

Philoſopher's Stone.

fix and coagulate this by means of ſulphur, out of 19 ounces of lead you will have 11 of gold: or, if you reduce the lead from 18 to 14, you will then have converted it into mercury; and if you further purify this mercury to the proper ſtandard, you will have gold; provided you have but a ſulphur with which to fix and coagulate it. Such is the foundation of the opinion of the philoſopher's ſtone; which the alchemiſts contend to be a moſt ſubtile, fixed, concentrated fire, which, as ſoon as it melts with any metal, does, by a magnetic virtue, immediately unite itſelf to the mercurial body of the metal, volatilize and cleanſe off all that is impure therein, and leave nothing but a maſs of pure gold. Many frauds and artifices have unqueſtionably been practiſed in this operation, and there might be political reaſons why princes and others ſhould encourage thoſe who pretended to a power of furniſhing this inexhauſtible ſource of wealth; but it would be wrong to cenſure as impoſtors all thoſe who have declared themſelves convinced, from their own experiments, of the tranſmutability of baſe metals into gold. There are ſtrong reaſons, however, to believe that the authors have been deceived themſelves by fallacious appearances. Mr Boyle gives an account of a proceſs by which he imagines part of the ſubſtance of gold to have been tranſmuted into ſilver. He alſo relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was publiſhed in his own life-time, and ſince reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the tranſmutability of metals. See an account of this experiment, with remarks upon it by Dr Lewis, in his *Commerce of Arts*, ſect. 12. p. 297, &c.

Characters of the Kings and Queens of England.

"The opinion (ſays Holt) that one metallic or other foreign ſubſtance might be changed into another, was, it ſeems, at this time (reign of Henry VI. of England) propagated by certain chemiſts, whoſe obſervations on the ſurpriſing effects and alterations produced in certain ſubſtances by the force of heat, carried them far beyond what ſound judgement might warrant. The firſt inſtance of which on record is in vol. xi. p. 68. of the *Fœdera*; wherein Henry VI. grants a licence to John Cobbe, freely to work in the ſame; he having, by a philoſophical art, found out a method of transferring imperfect metals into perfect gold and ſilver.

Philoſophizing.

"This pretended ſecret, known afterwards by the name of the *Philoſopher's Stone*, or *powder*, was encouraged by four licences, granted to different projectors during this reign, and at ſundry times after, during this century particularly, and in ſucceeding times, all over Europe. The frenzy has not entirely ceaſed even to this day, although it meets with neither public encouragement nor confidence from men of ſcience or reaſon: the projectors having yet found nothing from their airy ſchemes in this mode of ſearch but certain ruin to their property." See CHEMISTRY.

The ſame author, when ſpeaking of the commerce of the kingdom, and the wonderful increaſe and riches of commercial cities, ſpeaks thus: "This is the true philoſopher's ſtone, ſo much ſought after in former ages, the diſcovery of which has been reſerved to genius, when ſtudying to improve the mechanic arts. Hence a pound of raw materials is converted into ſtuffs of fifty times its original value. And the metals too are not, indeed, tranſmuted into gold—they are more: for the labour of man has been able to work the baſer metal, by the ingenuity of art, ſo as to become worth more than many times its weight in gold."

PHILOSOPHIC, or PHILOSOPHICAL, ſomething belonging to PHILOSOPHY.

PHILOSOPHICAL EGG, among chemiſts, a thin glaſs body or bubble, of the ſhape of an egg, with a long neck or ſtem, uſed in digeſtions.

PHILOSOPHIZING, rules of. See NEWTONIAN *Philoſophy*, n° 16. and the following article.

PHILOSOPHY

1 Definitions of philoſophy.

IS a word derived from the Greek, and literally ſignifies the *love of wiſdom* (A). In its uſual acceptation, however, it denotes a ſcience, or collection of ſciences, of which the univerſe is the object; and of the term thus employed many definitions have been given, differing from one another according to the different views of their ſeveral authors. By Pythagoras, philoſophy is defined επιστημη των οντων, "the knowledge of things exiſting;" by Cicero, after Plato, *ſcientia rerum divinarum et humanarum cum cauſis*; and by the illuſtrious Bacon, *interpretatio naturæ*. Whether any of theſe definitions be ſufficiently preciſe, and at the ſame time ſufficiently comprehenſive, may be queſtioned; but if philoſophy in its utmoſt extent be capable of being adequately defined, it is not here that the definition ſhould be given. "Explanation (ſays an acute writer *), is the firſt office of a teacher; definition, if it be good, is the laſt of the inquirer after truth; but explanation is one thing, and definition quite another." It may be proper, however, to obſerve, that the definition given by Cicero is better than that of Pythagoras, becauſe the chief object of the philoſopher is to aſcertain the *cauſes* of things; and in this conſiſts the difference between

History of Philoſophy.

* [illegible] *Scale of Truth*, v. i. p. 8.

(A) The origin uſually attributed to the term *philoſophy* has been already noticed in the article PHILOSOPHER. M. Chauvin gives it a turn ſomewhat different. According to him, the word is derived from φιλος, a lover or friend, and σοφια, *wiſdom*; and therefore he underſtands the word to mean the *deſire* or *ſtudy of wiſdom*. For (ſays he) Pythagoras, conceiving that the application of the human mind ought rather to be called *ſtudy* than *ſcience*, refuſed the appellation of *wiſe* as too aſſuming, and took that of *philoſopher*.

History of Philoſophy.

his ſtudies and thoſe of the natural hiſtorian, who merely enumerates phenomena, and arranges them into ſeparate claſſes.

2 Its objects.

The principal objects of philoſophy are, God, nature, and man. That part of it which treats of God is called *theology*; that which treats of nature, *phyſics* and *metaphyſics*; and that which treats of man, *logic* and *ethics*. That theſe are not ſeparate and independent ſciences, but, as Bacon expreſſes it (B), branches from the ſame trunk, we ſhall endeavour to ſhow, after we have given, agreeably to our uſual plan, a ſhort hiſtory of philoſophy from the earlieſt ages to the preſent day.

To attempt to aſſign an *origin* to philoſophy, would be ridiculous; for every man endeavours to aſcertain the cauſes of thoſe changes which he obſerves in nature; and even children themſelves are inquiſitive after that which produces the ſound of their drums and their rattles. Children, therefore, and the moſt illiterate vulgar, have in all ages been philoſophers. But the firſt people among whom philoſophy was cultivated as a profeſſion, was probably the Chaldeans. We certainly read of none earlier; for though we have more authentic accounts of the Hebrews than of any other nation of remote antiquity, and have reaſon to believe that no people was civilized before them, yet the peculiar circumſtances in which they were placed, rendered all philoſophical inveſtigation to them uſeleſs, and even tended to ſuppreſs the very ſpirit of inquiry. The Egyptians indeed pretended to be the firſt of nations, and to have ſpread the bleſſings of religion and the light of ſcience among every other people; but, from the earlieſt records now extant, there is reaſon to believe that the Chaldeans were a civilized and powerful nation before the Egyptian monarchy was founded

3 Philoſophy of the Chaldeans.

Of the Chaldean philoſophy much has been ſaid, but very little is known. Aſtronomy ſeems to have been their favourite ſtudy; and at the era of Alexander's conqueſt of their country, they boaſted that their anceſtors had continued their aſtronomical obſervations through a period of 470,000 years. Extravagant claims to antiquity have been common in all nations (C). Caliſthenes, who attended the Macedonian conqueror, was requeſted by Ariſtotle to inform himſelf concerning the origin of ſcience in Chaldea; and upon examining into the grounds of this report, he found that their obſervations reached no farther backwards than 1903 years, or 2234 years before the Chriſtian era. Even this is a remoter antiquity than Ptolemy allows to their ſcience; for he mentions no Chaldean obſervations prior to the era of Nabonaſſar, or 747 years before Chriſt. That they cultivated ſomething which they called philoſophy at a much earlier period than this, cannot be queſtioned; for Ariſtotle †, on the credit of the moſt ancient records, ſpeaks of the Chaldean magi as prior to the Egyptian prieſts, who were certainly men of learning before the time of Moſes. For any other ſcience than that of the ſtars, we do not read that the Chaldeans were famous; and this ſeems to have been cultivated by them merely as the foundation of judicial aſtrology. Perſuading the multitude that all human affairs are influenced by the ſtars, and profeſſing to be acquainted with the nature and laws of this influence, their *wiſe men* pretended to calculate nativities, and to predict good and bad fortune ‡. This was the ſource of idolatry and various ſuperſtitions; and whilſt the Chaldeans were given up to ſuch dotages, true ſcience could not be much indebted to their labours. If any credit be due to Plutarch and Vitruvius, who quote Beroſus, (ſee BEROSUS), it was the opinion of the Chaldean *wiſe men* that an eclipſe of the moon happens when that part of its body which is deſtitute of fire is turned towards the earth. "Their coſmogony, as given by Beroſus, and preſerved by Syncellus, ſeems to be this, that all things in the beginning conſiſted of darkneſs and water; that a divine power dividing this humid maſs, formed the world; and that the human mind is an emanation from the Divine nature ||.

† *Apud Laert.* lib. 1. § 8.

‡ *Sext. Emp. ad Math.* lib. 4. § 2.

Strabo, lib. 100.

Cic. de Div. lib. 1. § 1.

|| *Enfield's Hiſt. Phil.* vol. i.

The large tract of country which comprehended the empires of Aſſyria and Chaldea, was the firſt peopled region on earth. From that country, therefore, the rudiments of ſcience muſt have been propagated in every direction through the reſt of the world; but what particular people made the earlieſt figure, after the Chaldeans, in the hiſtory of philoſophy, cannot be certainly known. The claim of the Egyptians is probably beſt founded; but as their ſcience was the immediate ſource of that of the Greeks, we ſhall defer what we have to ſay of it on account of the connection between the parent and the offspring, and turn our attention from Chaldean to Indian philoſophy, as it has been cultivated from a very early period by the Brachmans and Gymnoſophiſts. We paſs over Perſia, becauſe we know not of any ſcience peculiar to that kingdom, except the doctrines of the magi, which were religious rather than philoſophical; and of them the reader will find ſome account under the words MAGI, POLYTHEISM, and ZOROASTER.

4 Indian philoſophy.

From whatever quarter India received its wiſdom, we are certain that its philoſophers were held in high repute at a period of very remote antiquity, ſince they were viſited by Pythagoras and other ſages of ancient Greece, who travelled in purſuit of knowledge. Yet they ſeem to have been in that early age, as well as at preſent, more diſtinguiſhed for the ſeverity of their manners than for the acquiſition of ſcience; and, as Dr Enfield obſerves, to have more reſembled modern monks than ancient

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(B) Convenit igitur partiri *philoſophiam* in *doctrinas* tres; *doctrinam* de *numine*, *doctrinam* de *naturâ*, *doctrinam* de *homine*. Quoniam autem partitiones *ſcientiarum* non ſunt lineis diverſis ſimiles, quæ coeunt ad unum angulum; ſed potius ramis arborum, qui conjunguntur in uno trunco, qui etiam truncus ad ſpatium nonnullum integer eſt et continuus, antequam ſe partiatur in ramos. *De aug. Scient.* lib. iii. cap. 1.

(C) This claim of the Babylonians is thus rejected with contempt by Cicero; "Contemnamus Babylonios, et eos, qui è Caucaſo cœli ſigna ſervantes, numeris, et motibus, ſtellarum curſus perſequuntur; Condemnemus, inquam, hos aut *ſtultitiæ*, aut *vanitatis*, aut *imprudentiæ*, qui 470 millia annorum, ut ipſi dicunt, monumentis comprehenſa continent, et mentiri judicemus, nec *ſæculorum* reliquorum *judicium*, quod de ipſis futurum ſit, *pertimeſcere*. *De Divinatione*, lib. i. § 19.

cient philoſophers. The brachmans or bramins, it is well known, are all of one tribe; and the moſt learned of them are in their own language called *Pandits* or *Pandits*. The Greek writers, however, mention a ſociety called *Samanæans*, who, voluntarily devoting themſelves to the ſtudy of divine wiſdom, gave up all private property, committed their children to the care of the ſtate, and their wives to the protection of their relations. This ſociety was ſupported at the public expence; and its members ſpent their time in contemplation, in converſation on divine ſubjects, or in acts of religion.

5
Ingrafted on religion.

The philoſophy of the Indians has indeed from the beginning been engrafted on their religious dogmas, and ſeems to be a compound of fanatic metaphyſics and extravagant ſuperſtition, without the ſmalleſt ſeaſoning of rational phyſics. Very unlike the philoſophers of modern Europe, of whom a great part labour to exclude the agency of mind from the univerſe, the Pandits of Hindoſtan allow no powers whatever to matter, but introduce the Supreme Being as the immediate cauſe of every effect, however trivial. "Brehm, *the Spirit of God*, (ſays one of their moſt revered Bramins), is abſorbed in ſelf-contemplation. The ſame is the mighty Lord, who is preſent in every part of ſpace, whoſe omnipreſence, as expreſſed in the Reig Beid or Rigveda, I ſhall now explain. Brehm is one, and to him there is no ſecond; ſuch is truly Brehm. His omniſcience is ſelf-inſpired or ſelf-intelligent, and its comprehenſion includes every poſſible ſpecies. To illuſtrate this as far as I am able; the moſt comprehenſive of all comprehenſive faculties is omniſcience; and being ſelf-inſpired, it is ſubject to none of the accidents of mortality, *conception*, *birth*, *growth*, *decay*, or *death*; neither is it ſubject to paſſion or vice. To it the three diſtinctions of time, *paſt*, *preſent*, and *future*, are not. To it the three modes of being (D) are not. It is ſeparated from the univerſe, and independent of all. This omniſcience is named *Brehm*. By this omniſcient Spirit the operations of God are enlivened. By this Spirit alſo the 24 powers (E) of nature are animated. How is this? As the eye by the ſun, as the pot by the fire, as iron by the magnet (F), as variety of imitations by the mimic, as fire by the fuel, as the ſhadow by the man, as duſt by the wind, as the arrow by the ſpring of the bow, and as the ſhade by the tree; ſo by this Spirit the world is endued with the powers of intellect, the powers of the will, and the powers of action: ſo that if it emanates from the heart by the channel of the ear, it cauſes the perception of ſounds; if it emanates from the heart by the channel of the ſkin, it cauſes the perception of touch; if it emanates from the heart by the channel of the eye, it cauſes the perception of viſible objects; if it emanates from the heart by the channel of the tongue, it cauſes the perception of taſte; if it emanates from the heart by the channel of the noſe, it cauſes the perception of ſmell. This alſo invigorating the five members of action, and invigorating the five members of perception, and invigorating the five elements, and invigorating the five ſenſes, and invigorating the three diſpoſitions of the mind, &c. cauſes the creation or the annihilation of the univerſe, while itſelf beholds every thing as an indifferent ſpectator *."

* Preface to Halhed's Gentoo Laws.

From this paſſage it is plain that all the motions in the univerſe, and all the perceptions of man, are, according to the Bramins, cauſed by the immediate agency of the Spirit of God, which ſeems to be here conſidered as the ſoul of the world. But it appears from ſome papers in the Aſiatic Reſearches, that the moſt profound of theſe oriental philoſophers, and even the authors of their ſacred books, believe not in the exiſtence of matter as a ſeparate ſubſtance, but hold an opinion reſpecting it very ſimilar to that of the celebrated Berkeley. The Védantis (ſays Sir William Jones), unable to form a diſtinct idea of brute matter independent of mind, or to conceive that the work of Supreme Goodneſs was left a moment to itſelf, imagine that the Deity is ever preſent to his work, and conſtantly ſupports a ſeries of perceptions, which in one ſenſe they call *illuſory*, though they cannot but admit the reality of all created forms, as far as the happineſs of creatures can be affected by them.

6
Admits not the exiſtence of matter, and

This is the very immaterialiſm of Berkeley; and in proof that it is the genuine doctrine of the Bramins, the learned preſident quotes the *Bhágavat*, which is believed to have been pronounced by the Supreme Being, and in which is the following ſentence.

"Except the *firſt cauſe*, whatever may appear, and may not appear, in the mind, know that to be the mind's *Máyá*, or 'deluſion,' as light, as darkneſs."

7
[illegible]

We have ſhown elſewhere (ſee METAPHYSICS, Nº 269.) that the metaphyſical doctrines of the Bramins, reſpecting the human ſoul, differ not from thoſe of Pythagoras and Plato; and that they believe it to be an emanation from the great ſoul of the world, which, after many tranſmigrations, will be finally abſorbed in its parent ſubſtance. In proof of their believing in the metempſychoſis, Mr Halhed gives us the following tranſlation of what (he ſays) is a beautiful ſtanza in the Geētā: "As throwing aſide his old clothes, a man puts on others that are new; ſo our lives, quitting the old, go to other newer animals."

8
Phyſics of the Bramins.

From the Bramins believing in the ſoul of the world not only as the *firſt agent*, but as the immediate cauſe of every motion in nature, we can hardly ſuppoſe them

to

(D) To be awake, to ſleep, and to be abſorbed in a ſtate of unconſciouſneſs—a kind of trance.

(E) The 24 powers of nature, according to the Bramins, are the five elements, *fire*, *air*, *earth*, *water*, and *akaſh* (a kind of ſubtile æther); the five members of action, the *hand*, *foot*, *tongue*, *anus*, and *male organ of generation*; the five organs of perception, the *ear*, *eye*, *noſe*, *mouth*, and *ſkin*; the five ſenſes, which they diſtinguiſh from the organs of ſenſation; the three diſpoſitions of the mind, *deſire*, *paſſion*, and *tranquillity*; and the power of *conſciouſneſs*.

(F) If the work from which this extract is quoted be of as great antiquity as Mr Halhed ſuppoſes, the Bramins muſt have been acquainted with the phenomena of magnetiſm at a much earlier period than any other philoſophers of whom hiſtory makes mention.

to have made any great progreſs in that ſcience which in Europe is cultivated under the name of *phyſics*. They have no inducement to inveſtigate the laws of nature; becauſe, according to the firſt principles of their philoſophy, which, together with their religion, they believe to have been revealed from heaven, every phenomenon, however regular, or however anomalous, is produced by the voluntary act of an intelligent mind. Yet if they were acquainted with the uſe of fire-arms 4000 years ago, as Mr Halhed ſeems to believe, he who made that diſcovery muſt have had a very conſiderable knowledge of the powers of nature; for though gunpowder may have been diſcovered by accident in the Eaſt, as it certainly was in the Weſt many ages afterwards, it is difficult to conceive how mere accident could have led any man to the invention of a gun. In aſtronomy, geometry, and chronology too, they appear to have made ſome proficiency at a very early period. (See Astronomy, N° 4.). Their chronology and aſtronomy are indeed full of thoſe extravagant fictions which ſeem to be eſſential to all their ſyſtems; but their calculation of eclipſes, and their computations of time, are conducted upon ſcientific principles.

9
The aſtronomy.

Aſiatic Reſearches, vol. ii.

"It is ſufficiently known (ſays Mr Davis*) that the Hindoo diviſion of the ecliptic into ſigns, degrees, &c. is the ſame as ours; that their aſtronomical year is ſidereal, or containing that ſpace of time in which the ſun, departing from a ſtar, returns to the ſame; that it commences on the inſtant of his entering the ſign Aries, or rather the Hindoo conſtellation Méſha; that each aſtronomical month contains as many even days and fractional parts as he ſtays in each ſign; and that the civil differs from the aſtronomical account of time only in rejecting thoſe fractions, and beginning the year and month at ſunriſe, inſtead of the intermediate inſtant of the artificial day or night. Hence ariſes the unequal portion of time aſſigned to each month dependent on the ſituation of the ſun's apſis, and the diſtance of the vernal equinoctial colure from the beginning of Méſha in the Hindoo ſphere; and by theſe means they avoid thoſe errors which Europeans, from a different method of adjuſting their kalendar by intercalary days, have been ſubject to."

Mr Davis obſerves, that an explanation of theſe matters would have led him beyond his purpoſe, which was only to give a general account of the method by which the Hindoos compute eclipſes, and to ſhow that the ſcience of aſtronomy is as well known among them now as ever it was among their anceſtors. This he does very completely; but in the preſent ſhort hiſtorical ſketch, we can neither copy nor abridge his memoir. Suffice it to ſay, that he has ſhown the practical part of the Hindoo aſtronomy to be founded on mathematical principles; and that the learned Pandits appear to have truer notions of the form of the earth, and the economy of the univerſe, than thoſe which are aſcribed to their countrymen in general.

The ſame writer ſhows likewiſe, that the prodigious duration which the Hindoos attribute to the world, is the reſult of a ſcientific calculation, founded indeed on very whimſical principles. "It has been common with aſtronomers to fix on ſome epoch, from which, as from a radix, to compute the planetary motions; and the ancient Hindoos choſe that point of time counted back, when, according to their motions as they had determined them, they muſt have been in conjunction in the beginning of Méſha or Aries, and coeval with which circumſtance they ſuppoſed the *creation*. This, as it concerned the planets only, would have produced a moderate term of years compared with the enormous antiquity that will be hereafter ſtated: but having diſcovered a ſlow motion of the nodes and apſides alſo, and taken it into the computation, they found it would require a length of time correſponding with 1955884890 years now expired, when they were ſo ſituated, and 2364115110 years more before they would return to the ſame ſituation again, forming together the grand anomaliſtick period denominated a *Calpa*, and fancifully aſſigned as the day of Brahmá."

But though the mathematical part of the aſtronomy of the Pandits is undoubtedly reſpectable, their phyſical notions of the univerſe are in the higheſt degree ridiculous and extravagant. In the Vedas and Puranas, writings of which no devout Hindoo can diſpute the divine authority, eclipſes are ſaid to be occaſioned by the intervention of the monſter *Rahu*; and the earth to be ſupported by a ſeries of animals. "They ſuppoſe (ſays Mr Halhed) that there are 14 ſpheres, ſeven below and ſix above the earth. The ſeven inferior worlds are ſaid to be altogether inhabited by an infinite variety of ſerpents, deſcribed in every monſtrous figure that the imagination can ſuggeſt. The firſt ſphere above the earth is the immediate vault of the viſible heavens, in which the ſun, moon, and ſtars, are placed. The ſecond is the firſt paradiſe, and general receptacle of thoſe who merit a removal from the lower earth. The third and fourth are inhabited by the ſouls of thoſe men who, by the practice of virtue and dint of prayer, have acquired an extraordinary degree of ſanctity. The fifth is the reward of thoſe who have all their lives performed ſome wonderful act of penance and mortification, or who have died martyrs for their religion. The higheſt ſphere is the reſidence of Brahma and his particular favourites, ſuch as thoſe men who have never uttered a falſehood during their whole lives, and thoſe women who have voluntarily burned themſelves with their huſbands. All theſe are abſorbed in the divine eſſence."

10
Strange notions of the univerſe.

On ethics, the Hindoos have nothing that can be called philoſophy. Their duties, moral, civil, and religious, are all laid down in their *Vedas* and *Shaſters*; and enjoined by what they believe to be divine authority, which ſuperſedes all reaſoning concerning their fitneſs or utility. The buſineſs of their Pandits is to interpret thoſe books, which are extremely ancient, and written in a language that has long been unintelligible to every other order of men; but no Pandit will alter the text, however impoſſible to be reconciled to principles eſtabliſhed in his own practice of aſtronomy. On ſuch occaſions, the uſual apology for their ſacred books is, that "ſuch things may have been ſo formerly, and may be ſo ſtill; but that for aſtronomical purpoſes, aſtronomical rules muſt be followed*." The great duties of morality have been preſcribed in every religious code; and they are not overlooked in that of the Hindoos, though the higheſt merit that a Bramin can have conſiſts in voluntary acts of abſtinence and mortification, and in contempt of death.

11
Ethics of the Hindoos.

* *Davis's Memoir, Aſiatic Reſearches*, vol. ii.

Of

12
Philoſophy of the Arabians and Chineſe.

Of the ancient philoſophy of the Arabians and Chineſe nothing certain can be ſaid; and the narrow limits of ſuch an abſtract as this, do not admit of our mentioning the conjectures of the learned, which contradict each other, and are all equally groundleſs.

There is indeed ſufficient evidence that both nations were at a very early period obſervers of the ſtars; and that the Chineſe had even a theory by which they foretold eclipſes (ſee ASTRONOMY, Nº 2, 3.); but there is reaſon to believe that the Arabians, like other people in their circumſtances, were nothing more than judicial aſtrologers, who poſſeſſed not the ſmalleſt portion of aſtronomical ſcience.

Pliny makes mention of their magi, whilſt later writers tell us, that they were famous for their ingenuity in ſolving enigmatical queſtions, and for their ſkill in the arts of divination: but the authors of Greece are ſilent concerning their philoſophy; and there is not an Arabian book of greater antiquity than the Koran extant. (See PHILOLOGY, Section II.).

13
Early ſcience of the Phœnicians.

Leaving therefore regions ſo barren of information, let us paſs to the Phœnicians, whoſe commercial celebrity has induced many learned men to allow them great credit for early ſcience. If it be true, as ſeems highly probable, that the ſhips of this nation had doubled the Cape and almoſt encompaſſed the peninſula of Africa long before the era of Solomon (See OPHIR, Nº 10.), we cannot doubt that the Phœnicians had made great proficiency in the art of navigation, and in the ſcience of aſtronomy, at a period of very remote antiquity. Nor were theſe the only ſciences cultivated by that ancient people: the learned Cudworth has, in our opinion, ſufficiently proved that *Moſchus* or *Mochus* a Phœnician, who, according to Strabo, flouriſhed before the Trojan war, was the author of the atomic philoſophy afterwards adopted by Leucippus, Democritus, and others among the Greeks; and that it was with ſome of the ſucceſſors of this ſage that Pythagoras, as Jamblichus tells us, converſed at Sidon, and from them received his doctrine of *Monads* (See PYTHAGORAS). Another proof of the early progreſs of the Phœnicians in philoſophy may be found in the fragments of their hiſtorian Sanchoniatho which have been preſerved by Euſebius*. We are indeed aware that men of great celebrity have called in queſtion the authenticity of thoſe fragments, and even the very exiſtence of ſuch a writer as Sanchoniatho; but for this ſcepticiſm we can diſcover no foundation (See SANCHONIATHO). His hiſtory may have been interpolated in ſome places by the tranſlator Philo-Byblius; but Porphyry, Euſebius, and Theodoret, ſpeak of it as a work of undoubted credit, and affirm that its author flouriſhed before the Trojan war. Now this ancient writer teaches that, according to the *wiſe men* of his country, all things aroſe at firſt from the neceſſary agency of an active principle upon a paſſive chaotic maſs which he calls *mot*. This chaos Cudworth thinks was the ſame with the elementary *water* of Thales, who was alſo of Phœnician extraction; but Moſheim juſtly obſerves that it was rather *dark air*, ſince Philo tranſlates it ἀέρα ζοφώδη. Be this as it may, nothing can be more evident than that the Phœnicians muſt have made ſome progreſs in what muſt ſurely be conſidered as philoſophy, however falſe, ſo early as the era of Sanchoniatho; for ſpeculations about the origin of the world never occur to untaught barbarians. Beſides Moſchus and [illegible], Cadmus, who introduced letters into Greece, [illegible] edly be reckoned among the Phœnician philoſophers; for though [illegible] that the [illegible] of his invention, and though [illegible] that the Greeks, at the time of [illegible], were wholly deſtitute of [illegible] (See PHILOLOGY, Nº 1, [illegible]), yet the man who could [illegible] illiterate tongue to adopt the uſe of [illegible] characters, muſt have been a great maſter of the [illegible]. Several other Phœnician philoſophers are mentioned by Strabo; but as they flouriſhed at a later period, and philoſophized after the ſyſtematic mode of the Greeks, they fall not properly under our notice. We paſs on therefore to the philoſophy of Egypt.

14
Egyptian philoſophy.

It has been already obſerved that the Egyptians boaſted of being the firſt of nations, and the authors of all the ſcience which in ſeparate rays illuminated the reſt of the world. But though this claim was undoubtedly ill-founded, their high antiquity and early progreſs in the arts of civil life cannot be controverted. The Greeks with one voice confeſs that all their learning and wiſdom came from Egypt, either imported immediately by their own philoſophers, or brought through Phœnicia by the ſages of the eaſt; and we know from higher authority than the hiſtories of Greece, that at a period ſo remote as the birth of Moſes, the wiſdom of the Egyptians was proverbially famous. Yet the hiſtory of Egyptian learning and philoſophy, though men of the firſt eminence both ancient and modern have beſtowed much pains in attempts to elucidate it, ſtill remains involved in clouds of uncertainty. That they had ſome knowledge of phyſiology, arithmetic, geometry, and aſtronomy, are facts which cannot be queſtioned; but there is reaſon to believe that even theſe ſciences were in Egypt puſhed no farther than to the uſes of life. That they believed in the exiſtence of incorporeal ſubſtances is certain; becauſe Herodotus aſſures us that they were the firſt aſſertors of the immortality, pre-exiſtence, and tranſmigration of human ſouls, which they could not have been without holding thoſe ſouls to be at leaſt *incorporeal*, if not *immaterial*.

The author of Egyptian learning is generally acknowledged to have been [illegible], called by the Greeks *Hermes*, and by the Romans *Mercury*; but of this perſonage very little is known. Diodorus Siculus ſays that he was chief miniſter to Oſiris, and that he improved language, invented letters, inſtituted religious rites, and taught aſtronomy, muſic, and other arts. The ſame thing is affirmed by *Sanchoniatho*, whoſe antiquity has been already mentioned; by *Manetho* an Egyptian prieſt, who flouriſhed during the reign of Ptolemy Philadelphus; and by Plato, whoſe authority, as he reſided long in Egypt, and was himſelf an eminent philoſopher, is perhaps more to be depended upon than that of the other two. In the Philebus we are told that Thoth was the inventor of letters; and, leſt we [illegible] by [illegible] nothing more is meant than [illegible] or ſymbolical hieroglyphics, it is added, that he diſtinguiſhed between *vowels* and *conſonants*, determining the number of each. The ſame philoſopher, in his Phædrus, attributes to Thoth the invention of *arithmetic*, *geometry*, [illegible] diſputation ſaid to have been held between him and *Thamus* then king of Egypt, concerning the advantage and diſadvantage of his newly invented letters. Thoth boaſted that the invention, by aiding memory, would greatly contribute to the progreſs of ſcience; whilſt the monarch contended, that it would enervate men's natural faculties by making them truſt to written characters without exerting the powers of their own minds.

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* Prep. Ev.

All this, if real, muſt have happened before the era of Moſes; and ſince it is almoſt certain that alphabetical characters were in uſe prior to the *exod* of the Iſraelites from Egypt (See PHILOLOGY, N° 24, 25.) we may as well allow the invention to Thoth, as give it to an earlier author of unknown name. That arithmetic, geometry, and aſtronomy, were cultivated in Egypt from the moſt remote antiquity, is affirmed by all the ancients, and made in the higheſt degree probable by the ſituation of the country. The firſt elements of aſtronomy have certainly been diſcovered by various nations, whoſe habits of life led them to the frequent obſervation of the heavens; and it is obſerved by Cicero, that the Egyptians and Babylonians, dwelling in open plains where nothing intercepted the view of the heavenly bodies, naturally devoted themſelves to the ſtudy of that ſcience. The annual overflowing of the Nile, which broke up the boundaries of their lands, would lay the Egyptians under the neceſſity of adopting ſome method of ſettling thoſe boundaries anew; and neceſſity we know to be the parent of invention. Hence their early acquaintance with practical geometry cannot well be doubted. Their cuſtom of embalming their dead, and the perfection to which they carried that art (G), ſhows infallibly their knowledge of the properties of natural ſubſtances, and gives ſome reaſon to believe that they were not altogether ſtrangers to anatomy: but if we allow them to have been at this early period anatomiſts acquainted with the power of drugs, we can hardly refuſe them ſome ſkill in the art of phyſic, which they themſelves traced up to their gods and demigods, to *Serapis*, *Iſis*, and her ſon *Horus* or *Apollo*.

The art of alchymy has been ſaid to have been known by the ancient Egyptians; and from the author of the Egyptian philoſophy it has been called the *Hermetic art*. But though this is unqueſtionably a fiction, there is evidence that they were poſſeſſed of one art which is even yet a *deſideratum* in the practice of chemiſtry. "Moſes (we are told *) took the golden calf, which his brother had made for idolatrous purpoſes, and *burnt it in the fire*, and *ground it to powder*, and ſtrowed it on the water, and made the children of Iſrael drink of it." Had this fact been related by Herodotus or Diodorus Siculus, it would have been deemed ſufficient evidence that the Egyptians were even at that early period no ſtrangers to the art of chemiſtry: and ſurely the evidence ſhould not be the worſe for coming from the pen of the Hebrew lawgiver, who was himſelf educated in the court of Egypt.

* *Exod.* xxii. 20.

15
Not carried to high perfection.

But though it is thus evident that the rudiments of almoſt every uſeful ſcience were known in Egypt from the remoteſt antiquity, it does not appear that any of them was carried to a great degree of perfection, unleſs perhaps chemiſtry alone muſt be excepted. One would think that no ſcience could have been more indiſpenſably requiſite to them than geometry. And yet though Pythagoras is ſaid to have ſpent 22 years in Egypt ſtudying that ſcience and aſtronomy, he himſelf diſcovered (H) the famous 47th Prop. of Euclid's firſt book after his return to Samos. This, though a very uſeful, is yet a ſimple theorem; and ſince it was not reached by the Egyptian geometry, we cannot ſuppoſe that thoſe people had then advanced far in ſuch ſpeculations. The ſame concluſion muſt be drawn with reſpect to aſtronomy; for Thales is ſaid to have been the firſt that calculated an eclipſe of the ſun; and we nowhere read that the *Egyptians* pretended to diſpute that honour with him. To this it may be replied, that Pythagoras was in Egypt undoubtedly taught the true conſtitution of the ſolar ſyſtem, and what is more extraordinary, the doctrine of comets in particular, and of their revolutions, like the other planets, round the ſun (I). We grant that he was taught all this; but it was not ſcientifically, but dogmatically, as facts which the prieſts had received by tradition from their early anceſtors, and of which they had never queſtioned the truth nor enquired into the reaſons. Of this we need no better proof than that the Pythagorean ſyſtem of the ſun was totally neglected by the Greeks as ſoon as they began to frame hypotheſes and to ſpeculate in philoſophy (K).

16
Their knowledge of the ſolar ſyſtem.

But

(G) It is true that the diſſection of ſome mummies has leſſened the high opinion long entertained of the ſkill of the ancient Egyptians in the art of embalming; yet it muſt be granted that their knowledge of antiſeptic drugs was great, ſince it is now certainly known, even from theſe diſſections, that by means of ſuch drugs they contrived to preſerve rags of cloth from corruption for upwards of 3000 years.

(H) This diſcovery he claimed; and his claim was admitted by the Greek writers without having been *directly* controverted ſince. An excellent mathematician, however, has ſhown that the equality between the ſquare of the hypothenuſe of a right-angled triangle, and the ſum of the ſquares on the other two ſides, was known to the aſtronomers of India at a period long prior to that of Pythagoras. Notwithſtanding this, it is certainly poſſible that the ſage of Samos may have made the diſcovery himſelf, though we think the contrary much more probable; for we agree with the able writer already mentioned, that Pythagoras, who is generally believed to have converſed with Indian brachmans as well as Egyptian prieſts, may have derived from them "ſome of the ſolid as well as the viſionary ſpeculations with which he delighted to inſtruct or amuſe his diſciples." See *Tranſactions of the Royal Society of Edinburgh*, vol. ii. Memoir xiii. Phyſic Claſs.

(I) This is recorded by Ariſtotle and Plutarch; and thus expreſſed by Ammianus Marcellinus.—"Stellas quaſdam, *ceteris ſimiles*, quarum *ortus orbituſque*, quibus ſint temporibus *præſtituti* humanis mentibus ignorari. Lib. xxv. cap. 10.

(K) *Fixas* in ſupremis mundi partibus immotas perſiſtere, et planetas his inferiores circa ſolem revolvi, terram pariter moveri curſu annuo, diurno vero circa axem propriam, et ſolem ceu focum univerſi in omnium centro quieſ-

cere,

History of Philoſophy.

But it may ſeem ſtrange, and certainly is ſo, that the Egyptian prieſts, in the days of Pythagoras, ſhould have preſerved ſo great a diſcovery of their anceſtors, and at the ſame time have totally forgotten the principles and reaſoning which led to a concluſion apparently contrary to the evidence of ſenſe. This is a difficulty which we pretend not to remove, though the fact which involves it ſeems to be beyond the reach of controverſy. Perhaps the following obſervations may throw upon it a feeble light. According to Manetho, the written monuments of the firſt Thoth were loſt or neglected in certain civil revolutions or natural calamities which befel the kingdom of Egypt. After many ages great part of them were recovered by an ingenious interpretation of the ſymbols which he had inſcribed upon ancient columns; and the man who made this interpretation was called the ſecond *Thoth* or *Hermes Triſmegiſtus*. But *thrice illuſtrious* as this perſonage was, it is at leaſt poſſible that he may have been much inferior to the former Hermes, and have read his writings and tranſcribed his concluſions without being able to comprehend the principles or reaſoning which led to thoſe concluſions. Any man who underſtands Latin might tranſlate into his own tongue the concluſions of Newton; but much more would be requiſite to make him comprehend the demonſtrations of his ſublime geometry. By what mode of reaſoning the firſt Hermes (L) was led to the true idea of the ſolar ſyſtem, or whether it was by reaſoning at all, cannot now be known; but it ſeems very evident, that when the intercourſe between the Egyptians and Greeks firſt commenced, the wiſdom of the former people conſiſted chiefly in the ſcience of legiſlation and civil policy, and that the philoſopher, the divine, the legiſlator, and the poet, were all united in the ſame perſon. Their coſmogony (for all the ancients who pretended to ſcience framed coſmogonies) differed little from that of the Phœnicians already mentioned. They held that the world was produced from chaos by the energy of an intelligent principle; and they likewiſe conceived that there is in nature a continual tendency towards diſſolution. In Plato's Timæus, an Egyptian prieſt is introduced deſcribing the deſtruction of the world, and aſſerting that it will be effected by means of water and fire. They conceived that the univerſe undergoes a periodical conflagration; after which all things are reſtored to their original form, to paſs again through a ſimilar ſucceſſion of changes.

17
Their moral ſcience.
Enfield's Hiſtory of Philoſophy.

"Of preceptive doctrine the Egyptians had two kinds, the one ſacred, the other vulgar. The former, which reſpected the ceremonies of religion and the duties of the prieſts, was doubtleſs written in the ſacred books of Hermes, but was too carefully concealed to paſs down to poſterity. The latter conſiſted of maxims and rules of virtue, prudence, or policy. Diodorus Siculus relates many particulars concerning the laws, cuſtoms, and manners of the Egyptians; whence it appears that ſuperſtition mingled with and corrupted their notions of morals. It is in vain to look for accurate principles of ethics among an ignorant and ſuperſtitious people. And that the ancient Egyptians merited this character is ſufficiently evident from this ſingle circumſtance, that they ſuffered themſelves to be deceived by impoſtors, particularly by the profeſſors of the fanciful art of aſtrology; concerning whom Sextus Empiricus juſtly remarks, that they have done much miſchief in the world, by enſlaving men to ſuperſtition, which will not ſuffer them to follow the dictates of right reaſon." See EGYPT, MYSTERIES, MYTHOLOGY, &c.

18
Grecian philoſophy.

From Egypt and Phœnicia philoſophy paſſed into Greece; where it was long taught without ſyſtem, as in the countries from which it was derived. Phoroneus, Cecrops, Cadmus, and Orpheus, were among the earlieſt inſtructors of the Greeks; and they inculcated Egyptian and Phœnician doctrines in detached maxims, and enforced them, not by ſtrength of argument, but by the authority of tradition. Their coſmogonies were wholly Phœnician or Egyptian, diſguiſed under Grecian names; and they taught a future ſtate of rewards and puniſhments. The planets and the moon Orpheus conceived to be habitable worlds, and the ſtars to be fiery bodies like the ſun: but he taught that they are all animated by divinities; an opinion which prevailed both in Egypt and the eaſt: and it does not appear that he gave any other proof of his doctrines than a confident aſſertion that they were derived from ſome god. See ORPHEUS.

Hitherto

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cere, antiquiſſima fuit philoſophantium ſententia. Ab Ægyptiis autem aſtrorum antiquiſſimis obſervatoribus propagatam eſſe hanc ſententiam veriſimile eſt. Et etiam ab illis et à gentibus conterminis ad Græcos, gentem magis philologicam quam philoſophicam, philoſophia omnis antiquior juxta et ſenior manaſſe videtur. Sed inde docuerunt Anaxagoras, Democritus, et alii nonnulli, terram in centro mundi immotam ſtare, et aſtra omnia in occaſum, alia celerius, alia tardius moveri, idque in ſpatiis liberrimis. Namque orbis ſolidi poſtea ab Eudoxo, Calippo, Ariſtotele, introducti ſunt; declinante indies philoſophia primitus introducta, et novis Græcorum commentis paulatim prævalentibus. Quibus *vinculis* ANTIQUI planetas in ſpatiis liberis retineri, deque curſu rectilineo perpetuo retractas in orbem regulariter agi docuere, non conſtat. *Newton de Mundi Syſtemate.*

(L) Some authors, deeply ſkilled in the Hebrew language, have thought that the true ſyſtem of the ſun and planets may be perceived in the Scriptures of the Old Teſtament, and that it is only from the ignorance or careleſſneſs of the tranſlators that it does not appear in the Engliſh bible and other verſions. The writer of this article confeſſes that his knowledge of the Hebrew is very limited, which is probably the reaſon that to him the arguments of theſe men appear weak and their criticiſms fanciful. No man, however, has a higher veneration than he for the ſacred volume, which he believes to have been given for nobler purpoſes than to teach its readers the ſcience of aſtronomy; but could the principles of that ſcience be found in it, he ſhould be ſtrongly inclined to think that the firſt Thoth was Joſeph, and that the monarch to whom he was miniſter was the far famed Oſiris. Were there any ſolid foundation for this ſuppoſition, it would be eaſy to conceive how Thoth acquired his ſcience, and how the Egyptian prieſts might retain juſt notions of the ſolar ſyſtem in general, long after they had forgotten the evidence upon which he communicated thoſe notions to their anceſtors.

Hitherto we have ſeen philoſophy in its ſtate of infancy and childhood, conſiſting only of a collection of ſententious maxims and traditionary opinions; but among the Greeks, an ingenious and penetrating people, it ſoon aſſumed the form of profound ſpeculation and ſyſtematic reaſoning. Two eminent philoſophers aroſe nearly at the ſame period, who may be conſidered as the parents not only of Grecian ſcience, but of almoſt all the ſcience which was cultivated in Europe prior to the era of the great Lord Bacon: Theſe were Thales and Pythagoras; of whom the former founded the Ionic ſchool and the latter the Italic; from which two ſprung the various ſects into which the Greek philoſophers were afterwards divided. A bare enumeration of theſe ſects is all that our limits will admit of; and we ſhall give it in the perſpicuous language and juſt arrangement of Dr Enfield, referring our readers for a fuller account than we can give of their reſpective merits to his abridged tranſlation of Brucker's hiſtory.

19
The Ionic ſchool.

Of the Ionic School were, 1. The Ionic ſect proper, whoſe founder Thales had as his ſucceſſors Anaximenes, Anaxagoras, Diogenes Apolloniates, and Archelaus. 2. The Socratic ſchool, founded by Socrates, the principal of whoſe diſciples were Xenophon, Æſchines, Simon, Cebes, Ariſtippus, Phædo, Euclid, Plato, Antiſthenes, Critias, and Alcibiades. 3. The Cyrenaic ſect, of which Ariſtippus was the author: his followers were, his daughter Arete, Hegiſias, Anicerris, Theodorus, and Bion. 4. The Megaric or Eriſtic ſect, formed by Euclid of Megara; to whom ſucceeded Eubulides, Diodorus, and Stilpo, famous for their logical ſubtlety. 5. The Eliac or Eretriac ſchool, raiſed by Phædo of Elis, who, though he cloſely adhered to the doctrine of Socrates, gave name to his ſchool. His ſucceſſors were Pliſtanus and Menedemus; the latter of whom, being a native of Eretria, transferred the ſchool and name to his own couutry. 6. The Academic ſect, of which Plato was the founder. After his death, many of his diſciples deviating from his doctrine, the ſchool was divided into the old, new, and middle academies. 7. The Peripatetic ſect, founded by Ariſtotle, whoſe ſucceſſors in the Lyceum were Theophraſtus, Strato, Lycon, Ariſto, Critolaus, and Diodorus. Among the Peripatetics, beſides thoſe who occupied the chair, were alſo Dicæarchus, Eudemus, and Demetrius Phalereus. 8. The Cynic ſect, of which the author was Antiſthenes, whom Diogenes, Oneſicritus, Crates, Metrocles, Menipus, and Menedemus, ſucceeded. In the liſt of Cynic philoſophers muſt alſo be reckoned Hipparchia, the wife of Crates. 9. The Stoic ſect, of which Zeno was the founder. His ſucceſſors in the porch were Perſæus, Ariſto of Chios, Herillus, Sphærus, Cleanthes, Chryſippus, Zeno of Tarſus, Diogenes the Babylonian, Antipater, Panætius, and Poſidonius.

20
The Italic ſchool.

Of the Italic School were, 1. The Italic ſect proper: it was founded by Pythagoras, a diſciple of Pherecydes. The followers of Pythagoras were Ariſtæus, Mneſarchus, Alcmæon, Ecphantus, Hippo, Empedocles, Epicharmus, Ocellus, Timæus, Archytas, Hippaſus, Philolaus, and Eudoxus. 2. The Eleatic ſect, of which Xenophanes was the author: his ſucceſſors, Parmenides, Meliſſus, Zeno, belonged to the metaphyſical claſs of this ſect; Leucippus, Democritus, Protagoras, Diogoras, and Anaxarchus, to the phyſical. 3. The Heraclitean ſect, which was founded by Heraclitus, and ſoon afterwards expired: Zeno and Hippocrates philoſophiſed after the manner of Heraclitus, and other philoſophers borrowed freely from his ſyſtem. 4. The Epicurean ſect, a branch of the Eleatic, had Epicurus for its author; among whoſe followers were Metrodorus, Polyænus, Hermachus, Polyſtratus, Baſilides, and Protarchus. 5. The Pyrrhonic or Sceptic ſect, the parent of which was Pyrrho: his doctrine was taught by Timon the Phliaſian; and after ſome interval was continued by Ptolemy a Cyrenean, and at Alexandria by Æneſidemus.

Of the peculiar doctrines of theſe ſects, the reader will in this work find a ſhort account either in the lives of their reſpective founders, or under the names of the ſects themſelves. We ſhall only obſerve at preſent, that though many of them were undoubtedly abſurd, and many wicked, it would yet perhaps be going too far to ſay with ſome, that the philoſophy of Greece became impious under Diagoras, vicious under Epicurus, HYPOCRITICAL UNDER ZENO, impudent under Diogenes, covetous under Demochares, voluptuous under Metrodorus, fantaſtical under Crates, ſcurrilous under Menippus, licentious under Pyrrho, and quarrelſome under Cleanthes. Of the truth of this heavy charge every reader muſt judge for himſelf. We are ſtrongly inclined to think, that there were virtues and vices peculiar to each ſect; "and that the ſects themſelves had an affinity more or leſs direct with the different temperaments of man; whence the choice of ſectators often depended on phyſical influence, or a peculiar diſpoſition of their organs. Nothing appears more natural than that thoſe men who were born with great force of mind and ſtrong nerves ſhould diſcover a predilection for ſtoiciſm; while mortals, endowed by nature with more delicacy of fibres and keener ſenſibility, fled for refuge to the myrtles of Epicurus. People whoſe temperaments partook of no extremes, were always inclined either for the Lyceum or the Academy. Such as poſſeſſed ſolidity of underſtanding ranged themſelves with Ariſtotle; and thoſe who had only genius, or even pretenſions to that endowment, went to augment the crowd of Platoniſts."

Pauw's Philoſophical Diſſertation, &c.

21
Grecian mode of philoſophizing.

All the ſyſtematical philoſophers, however, purſued their inquiries into nature by nearly the ſame method. Of their philoſophy as well as of ours, the univerſe, with all that it contains, was the vaſt object; but the individual things which compoſe the univerſe are infinite in number and ever changing; and therefore, according to an eſtabliſhed maxim of theirs, incapable of being the ſubjects of human ſcience *. To reduce this infinitude, and to fix thoſe fleeting beings, they eſtabliſhed certain definite arrangements or claſſes, to ſome of which every thing paſt, preſent, or to come, might be referred; and having aſcertained, as they thought, all that could be affirmed or denied of theſe claſſes, they proved, by a very ſhort proceſs of ſyllogiſtic reaſoning, that what is true of the claſs muſt be true of every individual comprehended under it. The moſt celebrated of theſe arrangements is that which is known by the name of *categories;* which Mr Harris thinks at leaſt as old as the era of Pythagoras, and to the forming of which mankind would, in his opinion, be neceſſarily led by the following conſiderations: Every ſubject of human thought is either *ſubſtance* or *attribute;* but *ſubſtance* and *attribute* may each of them

22
The categories.

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* *Boeth. in Prædic. et Ariſt. Phyſic.* lib. i.

be modified under the different characters of *univerſal* or *particular*. Hence there ariſes a quadruple arrangement of things into *ſubſtance univerſal* and *ſubſtance particular*; into *attribute univerſal* and *attribute particular*; to ſome one of *which four* not only our words and ideas, but every individual of that immenſe multitude of things which compoſe the univerſe, may be deduced. This arrangement, however, the learned author thinks too limited; and he is of opinion, that, by attending to the ſubſtances with which they were ſurrounded, the Grecian ſchools muſt ſoon have diſtinguiſhed between the attributes *eſſential* to all ſubſtances and thoſe which are only *circumſtantial*; between the attributes proper to *natural* ſubſtances or bodies, and thoſe which are peculiar to *intelligible* ſubſtances or minds. He likewiſe thinks, that the *time* and *place* of the exiſtence of ſubſtances not preſent, muſt ſoon have attracted their attention; and that in conſidering the place of this or that ſubſtance, they could hardly avoid thinking of its *poſition* or *ſituation*. He is of opinion, that the ſuperinduction of one ſubſtance upon another would inevitably ſuggeſt the idea of *cloathing* or *habit*, and that the variety of *co-exiſting ſubſtances* and *attributes* would diſcover to them another attribute, viz. that of *relation*. Inſtead therefore of confining themſelves to the ſimple diviſion of *ſubſtance* and *attribute*, they divided *attribute* itſelf into nine diſtinct ſorts, ſome *eſſential* and others *circumſtantial*; and thus by ſetting ſubſtance at their head, made ten *comprehenſive univerſal genera*, called, with reference to their Greek name, *categories*, and with reference to their Latin name *predicaments*. Theſe categories are, SUBSTANCE, QUALITY, QUANTITY, RELATION, ACTION, PASSION, WHEN, WHERE, POSITION, and HABIT; which according to the ſyſtematic philoſophy of the Greeks, comprehend every human ſcience and every ſubject of human thought. *Hiſtory*, natural and civil, ſprings, ſays Mr Harris, out of SUBSTANCE; *mathematics* out of QUANTITY; *optics* out of QUALITY and QUANTITY; *medicine* out of the *ſame*; *aſtronomy* out of QUANTITY and MOTION; *muſic* and *mechanics* out of the *ſame*; *painting* out of QUALITY and SITE; *ethics* out of RELATION; *chronology* out of WHEN; *geography* out of WHERE; *electricity*, *magnetiſm*, and *attraction*, out of ACTION and PASSION; and ſo in other inſtances.

23
and predicables

To theſe categories, conſidered as a mere arrangement of ſcience, we are not inclined to make many objections. The arrangement is certainly not complete: but this is a matter of comparatively ſmall importance; for a complete arrangement of ſcience cannot, we believe, be formed. The greateſt objection to the categories ariſes from the uſe that was made of them by almoſt every philoſopher of the Grecian ſchools; for thoſe ſages having reduced the objects of all human ſcience to ten general heads or general terms, inſtead of ſetting themſelves to inquire by a painful induction into the nature and properties of the real objects before them, employed their time in conceiving what could be predicated of *ſubſtance* in general, of this or that *quality*, *quantity*, *relation*, &c. in the abſtract: and they ſoon found, that of ſuch general conceptions as the *categories* there are but five *predicables* or claſſes of *predicates* in nature. The firſt claſs is that in which the *predicate* is the *genus* of the *ſubject*; the ſecond, that in which it is the *ſpecies* of the *ſubject*; the third, is when the *predicate* is the *ſpecific difference* of the *ſubject*; the fourth, when it is a *property* of the *ſubject*; and the fifth, when it is ſomething *accidental* to the *ſubject* (ſee LOGIC, Part II. chap. ii. and iii.). Having proceeded thus far in their ſyſtem, they had nothing to do with individuals but to arrange them under their proper categories, which was commonly done in a very arbitrary manner; and then, with the formality of a ſyllogiſm, to predicate of each the predicable of the genus or ſpecies to which it belonged. But by this method of proceeding, it is obvious that no progreſs whatever could be made in phyſical, metaphyſical, or ethical ſcience; for if the individual truly belongs to the category under which it is arranged, we add nothing to our ſtock of knowledge by affirming or denying of it what we had before affirmed or denied of the whole genus: and if it belong not to the category under which we arrange it, our ſyllogiſing will only give the appearance of proof to what muſt, from the nature of things, be an abſolute falſehood. It is only by experiments made on various ſubſtances apparently of the ſame kind that they can be certainly known to belong to the ſame category; and, when this is done, all ſyllogiſtic reaſoning from the genus to the ſpecies, and from the ſpecies to the individual, is but ſolemn trifling, as every propoſition in this retrograde courſe takes for granted the thing to be proved.

24
are no inſtruments of ſcience.

25
This philoſophy was diſſeminated through the whole world;

Yet this mode of philoſophizing ſpread from Greece almoſt over the whole world. It was carried by Alexander into Aſia, by his ſucceſſors into Egypt; and it found its way to Rome after Greece became a province of the empire. It was adopted by the Jews, by the fathers of the Chriſtian church, by the Mahommedan Arabs during the caliphate, and continued to be cultivated by the ſchoolmen through all Europe, till its futility was expoſed by Lord Bacon (M). The profeſſors of this philoſophy often diſplayed great acuteneſs; but their ſyſtems were built on mere hypotheſes, and ſupported by ſyllogiſtic wrangling. Now and then indeed a ſuperior genius, ſuch as Alhazen and our countryman Roger Bacon, broke through the trammels of the ſchools, and, regardleſs of the authority of the Stagyrite and his *categories*, made real diſcoveries in phyſical ſcience by experiments judiciouſly conducted on individual ſubſtances (ſee BACON, *Roger*; and OPTICS, n° 6.); but the ſcience in repute ſtill continued to be that of *Generals*.

It was indeed a combination of abſurd metaphyſics with more abſurd theology; and that which is properly called *phyſics*, had in Europe no place in a liberal education from the end of the eighth century to the end of the fourteenth. Towards the beginning of this period of darkneſs, the whole circle of inſtruction, or

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(M) Scientiæ, quas habemus, fere à Græcis fluxerunt. Quæ enim ſcriptores Romani, aut Arabes, aut recentiores addiderunt, non multa, aut magni momenti ſunt: et qualiacunque ſint, fundata ſunt ſuper baſin eorum quæ inventa ſunt à Græcis. *Bacon*.

History of Philoſophy.

the liberal arts as they were called, conſiſted of two branches, the *trivium* and the *quadrivium*; of which the former comprehended *grammar*, *rhetoric*, and *dialectics*; the latter *muſic*, *arithmetic*, *geometry*, and *aſtronomy*, to which was added about the end of the eleventh century the ſtudy of a number of *metaphyſical ſubtleties* equally uſeleſs and unintelligible.

Hitherto the works of the ancient Greek philoſophers had been read only in imperfect Latin tranſlations; and before the ſcholaſtic ſyſtem was completely eſtabliſhed, Plato and Ariſtotle had been alternately looked up to as the oracle in ſcience. The rigid ſchoolmen, however, univerſally gave the preference to the Stagyrite; becauſe his analyſis of body into matter and form is peculiarly calculated to keep in countenance the moſt incredible doctrine of the Romiſh church (ſee TRANSUBSTANTIATION): and upon the revival of Greek learning, this preference was continued after the ſchool philoſophy had begun to fall into contempt, on account of much uſeful information contained in ſome of his writings on ſubjects of natural hiſtory, and his ſuppoſed merit as a natural philoſopher. At laſt the intrepid ſpirit of Luther and his aſſociates ſet the minds of men free from the tyranny of ancient names, as well in human ſcience as in theology; and many philoſophers ſprung up in different countries of Europe, who profeſſed either to be *eclectics*, or to ſtudy nature, regardleſs of every authority but that of reaſon. Of theſe the moſt eminent beyond all compariſon was Francis Bacon Lord Verulam.

26 expoſed as futile by Lord Bacon;

This illuſtrious man having read with attention the writings of the moſt celebrated ancients, and made himſelf maſter of the ſciences which were then cultivated, ſoon diſcovered the abſurdity of pretending to account for the phenomena of nature by ſyllogiſtic reaſoning from hypothetical principles; and with a boldneſs becoming a genius of the firſt order, undertook to give a new chart of human knowledge. This he did in his two admirable works, intitled, 1. *De dignitate et augmentis ſcientiarum*; and; 2. *Novum organum ſcientiarum*, ſive *Judicia vera de interpretatione Naturæ*. In the former of theſe works, he takes a very minute ſurvey of the whole circle of human ſcience, which he divides into three great branches, *hiſtory*, *poetry*, and *philoſophy*, correſponding to the three faculties of the mind, *memory*, *imagination*, and *reaſon*. Each of theſe general heads is ſubdivided into minuter branches, and reflections are made upon the whole, which, though we can neither copy nor abridge them, will amply reward the peruſal of the attentive reader.

27 who eſtabliſhes a better method of inquiry.

The purpoſe of the *Novum Organum* is to point out the proper method of interpreting nature; which the author ſhows can never be done by the logic which was then in faſhion, but only by a painful and fair induction. "Homo naturæ miniſter (ſays he) et interpres tantum facit et intelligit, quantum de naturæ ordine re, vel mente obſervaverit; nec amplius ſcit aut poteſt. Syllogiſmus ad principia ſcientiarum non adhibetur, ad media axiomata fruſtra adhibetur, cum ſit ſubtilitati naturæ longe impar. Aſſenſum itaque conſtringit, non res. Syllogiſmus ex propoſitionibus conſtat, propoſitiones ex verbis, verba notionum teſſeræ ſunt. Itaque ſi notiones ipſæ (id quod baſis rei eſt) confuſæ ſint et temere à rebus abſtractæ, nihil in iis quæ ſuperſtruuntur, eſt firmitudinis. Itaque ſpes eſt una in *inductione vera*."

View of Bacon's Philoſophy.

To hypotheſes and preconceived opinions, which he calls *idola theatri*, this great man was not leſs inimical than to ſyllogiſms; and ſince his days almoſt every philoſopher of eminence, except Deſcartes and his followers (ſee DESCARTES and CARTESIANS), has profeſſed to ſtudy nature according to the method of induction ſo accurately laid down in the *Novum Organum*. On this method a few improvements have perhaps been made; but notwithſtanding theſe, Lord Bacon muſt undoubtedly be conſidered as the author of that philoſophy which is now cultivated in Europe, and which will continue to be cultivated as long as men ſhall have more regard for matters of fact than for hypothetical opinions. Of this mode of philoſophiſing we ſhall now give a ſhort, though we hope not inaccurate, view, by ſtating its objects, comparing it with that which it ſuperſeded, explaining its rules, and pointing out its uſes; and from this view it will appear, that its author ſhares with Ariſtotle the empire of ſcience.

28 View of his philoſophy.

THE univerſe, that unbounded object of the contemplation, the curioſity and the reſearches of man, may be conſidered in two different points of view.

In the firſt place, it may be conſidered merely as a collection of exiſtences, related to each other by means of reſemblances and diſtinction, ſituation, ſucceſſion, and derivation, as making parts of a whole. In this view it is the ſubject of pure deſcription.

To acquire an acquaintance with, or a knowledge of, the univerſe in this point of view, we muſt enumerate all the beings in it, mention all their ſenſible qualities, and mark all theſe relations for each. But this would be labour immenſe; and when done, an undiſtinguiſhable chaos. A book containing every word of a language would only give us the materials, ſo to ſpeak, of this language. To make it comprehenſible, it muſt be put into ſome form, which will comprehend the whole in a ſmall compaſs, and enable the mind to paſs eaſily from one word to another related to it. Of all relations among words, the moſt obvious are thoſe of reſemblance and derivation. An etymological dictionary, therefore, in which words are claſſed in conſequence of their reſemblances, and arranged by means of their derivative diſtinctions, will greatly facilitate the acquiſition of the language.

Juſt ſo in nature: The objects around us may be grouped by means of their reſemblance, and then arranged in thoſe groups by means of their diſtinctions and other relations. In this claſſification we are enabled to proceed by means of our faculty of abſtracting our attention from the circumſtances in which things differ, and turning it to thoſe only in which they agree. By the judicious employment of this faculty we are able not only to diſtribute the individuals into claſſes, but alſo to diſtribute thoſe claſſes into others ſtill more comprehenſive, by diſcovering circumſtances of reſemblance among them: for the fewer the circumſtances are which concur to form that reſemblance which has engaged our attention, the greater is the number of diſſimilar circumſtances which are neglected; and the more extenſive will be the claſs of individuals in which the reſemblance is obſerved. Thus a number of individuals reſembling each other in the

29 Natural hiſtory.

ſingle

View of Bacon's Philoſophy.

ſingle circumſtance of life, compoſes the moſt extenſive KINGDOM of ANIMALS. If it be required, that they ſhall farther reſemble in the circumſtance of having feathers, a prodigious number of animals are excluded, and we form the inferior *claſs* of BIRDS. We exclude a great number of birds, by requiring a further ſimilarity of web feet, and have the *order* of ANSERES. If we add lingua ciliata, we confine the attention to the *genus* of ANATES. In this manner may the whole objects of the univerſe be grouped, and arranged into kingdoms, claſſes, orders, genera, and ſpecies.

Such a claſſification and arrangement is called NATURAL HISTORY; and muſt be conſidered as the only foundation of any extenſive knowledge of nature. To the natural hiſtorian, therefore, the world is a collection of exiſtences, the ſubject of deſcriptive arrangement. His aim is threefold.

1. To obſerve with care, and deſcribe with accuracy, the various objects of the univerſe.

2. To determine and enumerate all the great claſſes of objects; to diſtribute and arrange them into all their ſubordinate claſſes, through all degrees of ſubordination, till he arrive at what are only accidental varieties, which are ſuſceptible of no farther diſtribution; and to mark with preciſion the principles of this diſtribution and arrangement, and the characteriſtics of the various aſſemblages.

3. To determine with certainty the particular group to which any propoſed INDIVIDUAL belongs.

DESCRIPTION therefore, ARRANGEMENT, and REFERENCE, conſtitute the whole of his employment; and in this conſiſts all his ſcience.

30 diſtinguiſhed from philoſophy.

Did the univerſe continue unchanged, this would conſtitute the whole of our knowledge of nature: but we are witneſſes of an uninterrupted ſucceſſion of changes, and our attention is continually called to the EVENTS which are inceſſantly happening around us. Theſe form a ſet of objects vaſtly more intereſting to us than the former; being the ſources of almoſt all the pleaſures or pains we receive from external objects.

We are therefore much intereſted in the ſtudy of the events which happen around us, and ſtrongly incited to proſecute it: but they are ſo numerous and ſo multifarious, that the ſtudy would be immenſe, without ſome contrivance for abbreviating and facilitating the taſk. The ſame help offers itſelf here as in the ſtudy of what may be called *quieſcent nature*. Events, like exiſtences, are ſuſceptible of claſſification, in conſequence of reſemblances and diſtinction; and by attention to theſe, we can acquire a very extenſive acquaintance with active nature. Our attention muſt be chiefly directed to thoſe circumſtances in which many events reſemble each other, while they differ perhaps in a thouſand others. Then we muſt attend to their moſt general diſtinctions; then to diſtinctions of ſmaller extent, and ſo on.

It is in this way accordingly that we have advanced in our knowledge of active nature, and are gradually, and by no means ſlowly, forming aſſemblages of events more and more extenſive, and diſtributing theſe with greater and greater preciſion into their different claſſes.

In the zealous and attentive proſecution of this taſk a very remarkable and intereſting obſervation occurs: In deſcribing thoſe circumſtances of ſimilarity among events, and particularly in diſtributing them according to theſe ſimilarities, it is impoſſible for us to overlook that conſtancy which is obſerved in the changes of nature in the events which are the objects of our contemplation. Events which have once been obſerved to accompany each other are obſerved always to do ſo.

View of Bacon's Philoſophy.

in the

The riſing of the ſun is always accompanied by the morning light of day, and his ſetting by the darkneſs of night. Sound argument is accompanied by conviction, impulſe by motion, kindneſs by a feeling of gratitude, and the perception of good by deſire. The unexcepted experience of mankind informs us, that the events of nature go on in certain regular trains; and if ſometimes exceptions ſeem to contradict this general affirmation, more attentive obſervation never fails to remove the exception. Moſt of the ſpontaneous events of nature are very complicated: and it frequently requires great attention and penetration to diſcover the ſimple event amidſt a crowd of unneſſential circumſtances which are at once exhibited to our view. But when we ſucceed in this diſcovery, we never fail to acknowledge the perfect uniformity of the event to what has been formerly obſerved.

32 expected.

But this is not all: We firmly *believe* that this uniformity will *ſtill continue*; that fire will melt wax, will burn paper, will harden clay, as we have formerly obſerved it to do; and whenever we have undoubted proofs that the circumſtances of ſituation are preciſely the ſame as in ſome former caſe, though but once obſerved, we expect with irreſiſtible and unſhaken confidence that the event will alſo be the ſame.

It is not ſurely neceſſary to adduce many proofs of the univerſality of this law of human thought. The whole language and actions of men are inſtances of the fact. In all languages there is a mode of conſtruction which is uſed to expreſs this relation as diſtinct from all others, and the converſation of the moſt illiterate never confounds them, except when the conceptions themſelves are confounded. The general employment of the active and paſſive verb is regulated by it. *Turris everſa eſt à militibus; turris everſa eſt terræ motu*, expreſs two relations, and no ſchoolboy will confound them. The diſtinction therefore is perceived or felt by all who can ſpeak grammatically. Nor is any language without general terms to expreſs this relation, cauſe—effect—to occaſion. Nay, it is a fact in the mind of brutes, who hourly ſhow that they expect the ſame uſes of every ſubject which they formerly made of it; and without this, animals would be incapable of ſubſiſtence, and man incapable of all improvement. From this alone memory derives all its value; and even the conſtancy of natural operation would be uſeleſs if not noticed or adapted to our purpoſes by this expectation of any confidence in that conſtancy.

After all the labours of ingenious men to diſcover the foundation of this irreſiſtible expectation, we muſt be contented with ſaying that ſuch is the conſtitution of the human mind. It is an *univerſal fact* in human thought; and for any thing that has been yet diſcovered, it is an *ultimate* fact, not included in any other ſtill more general. We ſhall ſoon ſee that this is ſufficient for making it the foundation of true human knowledge; all of which muſt in like manner be reduced to ultimate facts in human thought.

We muſt conſider this undoubted feeling, this perſuaſion of the conſtancy of nature, as an *inſtinctive* anticipation of events ſimilar to thoſe which we have already experienced. The general analogy of nature ſhould have diſpoſed philoſophers to acquieſce in this, however unwelcome to their vanity. In no inſtance of eſſential conſequence to our ſafety or well-being are we left to the guidance of our boaſted reaſon; God has given us the ſurer conduct of natural inſtincts. No caſe is ſo important as this: In none do we ſo much ſtand in need of a guide which ſhall be powerful, infallible, and rapid in its deciſions. Without it we muſt remain incapable of all inſtruction from experience, and therefore of all improvement.

Our ſenſations are undoubtedly feelings of our mind. But all thoſe feelings are accompanied by an inſtinctive reference of them to ſomething diſtinct from the feelings themſelves. Hence ariſes our perception of external objects, and our very notions of this externeity (pardon the term). In like manner, this anticipation of events, this irreſiſtible connection of the idea of fire with the idea of burning, is alſo a feeling of the mind: and this feeling is by a law of human nature referred, without reaſoning, to ſomething external as its cauſe; and, like our ſenſation, it is conſidered as a *ſign* of that external ſomething. It is like the conviction of the truth of a mathematical propoſition. This is referred by us to ſomething exiſting in nature, to a neceſſary and eternal relation ſubſiſting between the ideas which are the ſubjects of the propoſition. The conviction is the ſign or indication of this relation by which it is brought to our view. In preciſely the ſame manner, the irreſiſtible connection of ideas is interpreted as the ſenſation or ſign of a *neceſſary connection* of external things or events. Theſe are ſuppoſed to include ſomething in their nature which renders them inſeparable companions. To this bond of connection between external things we give the name of CAUSATION. All our knowledge of this relation of cauſe and effect, is the knowledge or conſciouſneſs of what paſſes in our own minds during the contemplation of the phenomena of nature. If we adhere to this view of it, and put this branch of knowledge on the ſame footing with thoſe called the *abſtract ſciences*, conſidering only the *relations* of ideas, we ſhall acquire *demonſtrative ſcience*. If we take any other view of the matter, we ſhall be led into inextricable mazes of uncertainty and error.

33
Our knowledge of cauſation.

We ſee then that the natural procedure of our faculty of abſtraction and arrangement, in order to acquire a more ſpeedy and comprehenſive knowledge of natural events, preſents them to our view in another form. We not only ſee them as *ſimilar* events, but as events naturally and neceſſarily *conjoined*. And the expreſſion of *reſemblance* among events is alſo an expreſſion of *concomitancy*; and this arrangement of events in conſequence of their reſemblance is in fact the *diſcovery* of thoſe accompaniments. The trains of natural appearance being conſidered as the appointments of the Author of Nature, has occaſioned them to be conſidered alſo as conſequences of *laws* impoſed on his works by their great author, and every thing is ſaid to be regulated by fixed laws. But this is the language of analogy. When a ſovereign determines on certain trains of conduct for his ſubjects, he iſſues his orders. Theſe orders are laws. He inforces the obſervance of them by his authority; and thus a certain regularity and conſtancy of conduct is produced. But ſhould a ſtranger, ignorant of the promulgation of theſe laws, and of the exerted authority of the magiſtrate, obſerve this uniformity of conduct, he would aſcribe it to the genius and diſpoſition of the people; and his obſervation would be as uſeful to him for directing the tenor of his own conduct, as the knowledge of the ſubject himſelf of the real ſource of this conſtancy is for directing his.

34
Laws of nature explained.

Juſt ſo in nature, while the theologian pretends, from his diſcoveries concerning the exiſtence and ſuperintendance of God, to know that the conſtant accompaniment of events is the conſequence of laws which the great Author and Governor of the univerſe has impoſed on his works, the ordinary philoſopher, a ſtranger to this ſcene, and to the unſearchable operations of the SUPREME MIND, muſt aſcribe this conſtancy to the nature of the things. There is a great reſemblance between the expreſſion *natural law* and *grammatical rule*. Rule in ſtrict language implies command; but in grammar it expreſſes merely a generality of *fact*, whether of flexion or conſtruction. In like manner, a LAW OF NATURE is to the philoſopher nothing but the expreſſion of a generality of fact. A natural or phyſical law is a generally obſerved fact; and whenever we treat any ſubject as a generally obſerved fact, we treat it phyſically. It is a phyſical law of the underſtanding that argument is accompanied by conviction; it is a phyſical law of the affection that diſtreſs is accompanied by pity; it is a phyſical law of the material world that impulſe is accompanied by motion.

And thus we ſee that the arrangement of events, or the diſcovery of thoſe general points of reſemblance, is in fact the diſcovery of the laws of nature; and one of the greateſt and moſt important is, that the laws of nature are conſtant.

There is no queſtion that this view of the univerſe is incomparably more intereſting and important than that which is taken by the natural hiſtorian; contemplating every thing that is of value to us, and, in ſhort, the whole life and movement of the univerſe. This ſtudy, therefore, has been dignified with the name of PHILOSOPHY and of SCIENCE; and natural hiſtory has been conſidered as of importance only in ſo far as it was conducive to the ſucceſsful proſecution of philoſophy.

35
Object of philoſophy.

But the philoſopher claims a ſuperiority on another account: he conſiders himſelf as employed in the diſcovery of cauſes, ſaying that philoſophy is the ſtudy of the objects of the univerſe as related by cauſation, and that it is by the diſcovery of theſe relations that he communicates to the world ſuch important knowledge. Philoſophy, he ſays, is the ſcience of cauſes. The vulgar are contented to conſider the prior of two inſeparably conjoined events as the cauſe of the other; the ſtroke on a bell, for inſtance, as the cauſe of ſound. But it has been clearly ſhown by the philoſopher, that between the blow on the bell and the ſenſation of ſound there are interpoſed a long train of events. The blow ſets the bell a trembling; this agitates the air in contact with the bell; this agitates the air immediately beyond it; and thus between the bell and the ear may be interpoſed a numberleſs ſeries of events, and as many more between the firſt impreſſion on the ear and that laſt impreſſion on the nerve by which the mind is affected. He can no longer therefore follow the nomenclature of the vulgar. Which of the events of this train therefore is the cauſe of the ſenſation? None of them:

36
Cauſes

them: It is that *ſomething* which inſeparably connects any two of them, and conſtitutes their bond of union. Theſe bonds of union or cauſes he conſiders as reſiding in one or both of the connected objects: diverſities in this reſpect muſt therefore conſtitute the moſt important diſtinctions between them. They are therefore with great propriety called the *qualities*, the *properties* of theſe reſpective ſubjects.

As the events from which we infer the exiſtence of theſe qualities of things reſemble in many reſpects ſuch events as are the conſequences of the exertion of our own powers, theſe qualities are frequently denominated POWERS, forces, energies. Thus, in the inſtance juſt now given of the ſound of a bell, we infer the powers of impulſe, elaſticity, nervous irritability, and animal ſenſibility.

37
inferred from effects.

In conſequence of this inference of a neceſſary connection between the objects around us, we not only infer the poſterior event from the prior, or, in common language, the effect from the cauſe, but we alſo infer the prior from the poſterior, the cauſe from the effect. We not only expect that the preſence of a magnet will be followed by certain motions in iron-filings, but when we obſerve ſuch motions, we infer the preſence and agency of a magnet. Joy is inferred from merriment, poiſon from death, fire from ſmoke, and impulſe from motion. And thus the appearances of the univerſe are the indications of the powers of the objects in it. Appearances are the language of nature, informing us of their cauſes. And as all our knowledge of the ſentiments of others is derived from our confidence in their veracity; ſo all our knowledge of nature is derived from our confidence in the conſtancy of natural operations. A veracity and credulity neceſſarily reſulting from that law of our mental conſtitution by which we are capable of ſpeech, conduct us in the one caſe; and the conſtancy of nature, and the principle of induction, by which we infer general laws from particular facts, conduct us in the other. As human ſentiment is inferred from language, and the exiſtence of external things from ſenſation; ſo are the laws of nature, and the powers of natural objects inferred from the phenomena. It is by the ſucceſsful ſtudy of this language of nature that we derive uſeful knowledge. The knowledge of the influence of motives on the mind of man enables the ſtateſman to govern kingdoms, and the knowledge of the powers of magnetiſm enables the mariner to pilot a ſhip through the pathleſs ocean.

38
Diſcoveries of Ariſtotle and Newton compared.

Such are the lofty pretenſions of philoſophy. It is to be wiſhed that they be well founded: for we may be perſuaded that a miſtake in this particular will be fatal to the advancement of knowledge. An author of great reputation † gives us an opportunity of deciding this queſtion in the way of experiment. He ſays that the ancients were philoſophers, employed in the diſcovery of cauſes, and that the moderns are only natural hiſtorians, contenting themſelves with obſerving the laws of nature, but paying no attention to the cauſes of things. If he ſpeak of their *profeſſed* aim, we apprehend that the aſſertion is pretty juſt in general. With very few exceptions indeed it may be affirmed of his favourite Ariſtotle, the philoſopher κατ' ἐξοχὴν, and of Sir Iſaac Newton. We ſelect theſe two inſtances, both becauſe they are ſet in continual oppoſition by this author, and becauſe it will be allowed that they were the moſt eminent ſtudents of nature (for we muſt not yet call them philoſophers) in ancient and modern times. Ariſtotle's profeſſed aim, in his moſt celebrated writings, is the inveſtigation of cauſes; and in the opinion of this author, he has been ſo ſucceſsful, that he has hardly left any employment for his ſucceſſors beſide that of commenting upon his works. We muſt on the other hand acknowledge that Newton makes no ſuch pretenſions, at leaſt in that work which has immortalized his name, and that his profeſſed aim is merely to inveſtigate the *general* laws of the planetary motions, and to apply theſe to the explanation of particular phenomena. Nor will we ſay that he has left no employment for ſucceeding inquirers; but, on the contrary, confeſs that he has only begun the ſtudy, has diſcovered but one law, and has enabled us to explain only the phenomena comprehended in it alone. But he has not been unſucceſsful; his inveſtigation has been complete; and he has diſcovered, beyond all poſſibility of contradiction, a *fact* which is obſerved through the whole extent of the ſolar ſyſtem; namely, that every body, nay, that every particle in it, is continually DEFLECTED toward every other body; and that this deflection is, in every inſtance, proportional to the quantity of matter in that body toward which the deflection is directed, and to the reciprocal of the ſquare of the diſtance from it. He has therefore diſcovered a phyſical law of immenſe extent. Nor has he been leſs ſucceſsful in the explanation of particular phenomena. Of this there cannot be given a better inſtance than the explanation of the lunar motions from the theory of gravity begun by Newton "Matheſi ſua facem præferente;" and now brought to ſuch a degree of perfection, that if the moon's place be computed from it for any moment within the period of two thouſand years back, it will not be found to differ from the place on which ſhe was actually obſerved by one hundredth part of her own breadth.

Diſcimus hinc tandem qua cauſa argentea Phœbe
Paſſibus haud æquis eat, et cur, ſubdita nulli
Hactenus aſtronomo, numerorum fræna recuſet.
Quæ toties animos veterum torſere ſophorum,
Quæque ſcholas hodie rauco certamine vexant,
Obvia conſpicimus, nube pellente matheſi;
Quæ ſuperos penetrare domos, et ardua cœli
Newtoni auſpiciis jam dat contingere templa.

We may now deſire the champions of the ſcience of cauſes to name any one cauſe which has really been diſcovered by their great maſter, whether in the operations of mind or of body. But they muſt not on this occaſion adduce the inveſtigation of any natural law in which he has ſometimes ſucceeded. With ſtill greater confidence may we challenge them to produce any remarkable inſtance of the explanation of natural phenomena either of mind or body. By explanation, we mean an account of the production, and an enumeration of all the circumſtances, ſuſceptible of a ſcrupulous compariſon with fact, and perfectly conſiſtent with it. It is here that the weakneſs of this philoſopher's pretenſions is moſt conſpicuous: and his followers candidly acknowledge, that in the inquiries which proceed by experiment, we have not derived great aſſiſtance from Ariſtotle's philoſophy. But this, ſay they, does not derogate from the pre-eminence of his philoſophy, becauſe he has ſhown that the *particular* fields of obſervation are to be cultivated only by means of experiment. But ſurely every field of *obſervation* is particular. There is no

[illegible]

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† *Ancient Metaphyſics.*

abſtract object of philoſophical reſearch, the ſtudy of which ſhall terminate in the philoſophy of univerſals. In every kind of inquiry, that cauſe alone muſt be ſuppoſed to act which we underſtand ſo far as to be able to appreciate its effects in particular circumſtances, and compare them with fact, and ſee their perfect coincidence. If we have diſcovered cauſes, they are *known* as far as they are diſcovered. Their genuine effects are known, and therefore the phenomena which reſult from their agency are underſtood. When therefore it is acknowledged, as it muſt be acknowledged, that mankind have made but little advances in the knowledge of nature, notwithſtanding the pretended diſcovery of cauſes by Ariſtotle, and the conducting clue of his philoſophy, till of late years; and when it is alſo allowed that *now*, while we are every day making great additions to this ſubordinate knowledge, the cauſes which Ariſtotle has diſcovered are forgotten, and his philoſophy is neglected; there is great room for ſuſpecting (to ſay the leaſt), that either the cauſes which philoſophy pretends to have diſcovered are not real, or that Ariſtotle and his followers have not aimed at the diſcovery of cauſes, but only at the diſcovery of natural laws, and have failed in the attempt.

39
Philoſophical cauſes diſcovered only

There ſeems here to be a previous queſtion: *Is it poſſible to diſcover a philoſophical cauſe*, that ſomething which is neither the prior nor the poſterior of the two *immediately* adjoining events, but their bond of union, and this diſtinct from the union itſelf? It is evident that this is an inquiry purely experimental. It is of *human knowledge* we ſpeak. This muſt depend on the nature of the human mind. This is a matter of contingency, known to us only by experiment and obſervation. By obſerving all the feelings and operations of the mind, and claſſing and arranging them like any other object of ſcience, we diſcover the general laws of human thought and human reaſoning; and this is all the knowledge we can ever acquire of it, or of any thing elſe.

Much has been written on this ſubject. The moſt acute obſervation and ſound judgment have been employed in the ſtudy; and we may venture to ſay, that conſiderable progreſs has been made in pneumatology. Many laws of human thought have been obſerved, and very diſtinctly marked; and philoſophers are buſily employed, ſome of them with conſiderable ſucceſs, in the diſtribution of them into ſubordinate claſſes, ſo as to know their comparative extent, and to mark their diſtinguiſhing characters with a preciſion ſimilar to what has been attained in botany and other parts of natural hiſtory; ſo that we may hope that this ſtudy will advance like others. But in all theſe reſearches, no phenomena have occurred which look like the perception or contemplation of theſe ſeparate objects of thought, theſe philoſophical cauſes, this POWER in abſtracto. No philoſopher has ever pretended to ſtate ſuch an object of the mind's obſervation, or attempted to group them into claſſes.

40
in the events.

We may ſay at once, without entering into any detail, that thoſe cauſes, thoſe bonds of neceſſary union between the naturally conjoined events or objects, are not only perceived *by means* of the events alone, but are perceived ſolely *in* the events, and cannot be diſtinguiſhed from the conjunctions themſelves. They are neither the objects of ſeparate obſervation, nor the productions of memory, nor inferences drawn from reflection on the laws by which the operation of our own minds are regulated; nor can they be derived from other perceptions in the way of argumentative inference. We cannot infer the paroxyſm of terror from the appearance of impending deſtruction, or the fall of a ſtone when not ſupported, as we infer the incommenſurability of the diagonal and ſide of a ſquare. This laſt is *implied* in the very conception or notion of a ſquare; not as a conſequence of its other properties, but as one of its eſſential attributes: and the contrary propoſition is not only falſe, but incapable of being diſtinctly conceived. This is not the caſe with the other phenomenon, or any matter of fact. The proofs which are brought of a mathematical propoſition, are not the reaſon of its being true, but the ſteps by which this truth is brought into our view; and frequently, as in the inſtance now given, this truth is perceived, not directly, but conſequentially, by the inconceivableneſs of the contrary propoſition.

41
Mr Hume's theory a *petitio principii*.

Mr Hume derives this irreſiſtible expectation of events from the known effect of cuſtom, the aſſociation of ideas. The corelated event is brought into the mind by this well known power of cuſtom, with that vivacity of conception which conſtitutes belief or expectation. But without inſiſting on the futility of his theory of belief, it is ſufficient to obſerve, that this explanation begs the very thing to be proved, when it aſcribes to cuſtom a *power* of any kind. It is the origin of this very power which is the ſubject in diſpute. Beſides, on the genuine principles of ſcepticiſm, this cuſtom involves an acknowledgement of paſt events, of a ſomething different from preſent impreſſions, which, in this doctrine (if doctrine it can be called), are the only certain exiſtences in nature: and, laſtly, it is known that *one* clear experience is a ſufficient foundation for this unſhaken confidence and anticipation. General cuſtom can never, on Mr Hume's principles, give ſuperior vivacity to any particular idea.

42
Another hypotheſis reſpecting cauſal connection.

This certain nonentity of it as a ſeparate object of obſervation, and this impoſſibility to derive this notion of neceſſary and cauſal connection between the events of the univerſe from any ſource, have induced two of the moſt acute philoſophers of Europe, Mr Leibnitz and Father Malebranche, to deny that there is any ſuch connection, and to aſſert that the events of the univerſe go on in correſponding trains, but without any cauſal connection, juſt as a well-regulated clock will keep time with the motions of the heavens without any kind of dependence on them. This harmony of events was pre-eſtabliſhed by the Author of the Univerſe, in ſubſerviency to the purpoſes he had in view in its formation.

All thoſe purpoſes which are cogniſable by us, may certainly be accompliſhed by this perfect adjuſtment. But without inſiſting on the fantaſtic wildneſs of this ingenious whim, it is quite enough to obſerve, that it alſo is a begging of the queſtion, becauſe it ſuppoſes cauſation when it aſcribes all to the agency of the Deity.

Thus have we ſearched every quarter, without being able to find a ſource from which to derive this perception of a neceſſary connection among the events of the univerſe, or of this confident expectation of the continuance of phyſical laws; and yet we are certain of the feeling, and of the perſuaſion, be its origin what it may: for we ſpeak intelligibly on this ſubject; we ſpeak familiarly of cauſe, effect, power, energy, neceſſary connection, motives and their influence, argument and conviction, reaſons and perſuaſion, allurements and emotions, of gravity, magnetiſm, irritability, &c.; and we carry on converſations on theſe ſubjects with much entertainment and ſeeming inſtruction. Language is the expreſſion of thought, and every word expreſſes ſome notion or conception of the mind; therefore it muſt be allowed, that we have ſuch notions as are expreſſed by cauſe, power, energy. But it is here, as in many caſes, we perceive a diſtinction without being able to expreſs it by a definition; and that we do perceive the relation of cauſation as diſtinct from all others, and in particular as diſtinct from the relation of contiguity in time and place; or the relation of agent, action, and patient, muſt be concluded from the uniformity of language, which never confounds them except on purpoſe, and when it is perceived. But even here we ſhall find, that none of the terms uſed for expreſſing thoſe powers of ſubſtance which are conceived as the cauſes of their characteriſtic phenomena, really expreſs any thing different from the phenomena themſelves. Let any perſon try to define the terms gravity, elaſticity, ſenſibility, and the like, and he will find that the definition is nothing but a deſcription of the phenomenon itſelf. The words are all derivatives, moſt of them verbal derivatives, implying action, gravitation, &c. As the general reſemblances in ſhape, colour, &c. are expreſſed by the natural hiſtorian by generic terms, ſo the general reſemblances in event are expreſſed by the philoſopher in generic propoſitions, which, in the progreſs of cultivation, are alſo abbreviated into generic terms.

43
The perception of this connection a firſt principle.

This abundantly explains the conſiſtency of our language on this ſubject, both with itſelf and with the operations of nature, without however affording any argument for the truth of the aſſumption, that cauſes are the objects of philoſophic reſearch as ſeparate exiſtences; or that this ſuppoſed neceſſary connection is a *neceſſary truth*, whether ſupreme or ſubordinate. But ſince the perception of it has its foundation in the conſtitution of the human mind, it ſeems intitled to the name of a *firſt principle*. We are hardly allowed to doubt of this, when we conſider the importance of it, and the care of nature to ſecure us in all things eſſential to our ſafety and well-being, from all danger, from inattention, ignorance, or indolence, by an inſtinct infallible in its information, and inſtantaneous in its deciſions. "It would not be like her uſual care (ſays Hume), if this operation of the mind, by which we infer like effects from like cauſes, and *vice verſa*, were entruſted to the fallacious deduction of our reaſon, which is ſlow in its operations, appears not in any degree during the firſt years of infancy, and in every age and period of human life is extremely liable to error. It is more conformable to her *ordinary caution* (mark the acknowledgment) to ſecure ſo neceſſary an act of the mind by ſome inſtinct, or blind tendency, which may be infallible and rapid in all its operations, may diſcover itſelf at the firſt appearance of life, and may be independent of all the laboured deductions of reaſon. As ſhe has taught us the uſe of our limbs, without giving us any knowledge of the nerves and muſcles by which they are actuated; ſo ſhe has implanted in us an inſtinct, which carries forward the thought in a courſe conformable to that eſtabliſhed among external objects, though we be ignorant of the powers and forces on which this regularity depends."

Such a knowledge is quite unneceſſary, and therefore cauſes are no more cogniſable by our intellectual powers than colours by a man born blind. Nay, whoever will be at the pains to conſider this matter agreeably to the received rules and maxims of logic, will find that neceſſary connection, or the nexus, or cauſation, can no more be the object of philoſophical diſcuſſion by man, than the ultimate nature of truth. It is preciſely the ſame abſurdity or incongruity, as to propoſe to examine light with a microſcope. Other intelligent beings may perceive them as eaſily as we hear ſounds. All that we can ſay is, that their exiſtence is poſſible, but by no means certain. Nay, it may be (and we may never know it) that we are not the efficient cauſes of our own actions, which may be effected by the Deity, or by miniſtering ſpirits; and this may even be true in the material world. But all this is indifferent to the real occupation of the philoſopher, and does not affect either the certainty, the extent, or the utility of the knowledge which he may acquire.

44
[illegible] laws.

We are now able to appreciate the high pretenſions of the philoſopher, and his claim to ſcientific ſuperiority. We now ſee that this can neither be founded on any ſcientific ſuperiority of his object, nor of his employment. His object is not cauſes; and his diſcoveries are nothing but the diſcovery of general facts, the diſcovery of phyſical laws; and his employment is the ſame with that of the deſcriptive hiſtorian. He obſerves and deſcribes with care and accuracy the events of nature; and then he groups them into claſſes, in conſequence of reſembling circumſtances, detected in the midſt of many others which are diſſimilar and occaſional. By gradually throwing out more circumſtances of reſemblance, he renders his claſſes more extenſive; and, by carefully marking thoſe circumſtances in which the reſemblance is obſerved, he characteriſes all the different claſſes; and, by a compariſon of theſe with each other, in reſpect to the number of reſembling circumſtances, he diſtributes his claſſes according to their generality and ſubordination; thus exhauſting the whole aſſemblage, and leaving nothing unarranged but accidental varieties. In this procedure it is to be remarked, that every grouping of ſimilar events is, *ipſo facto*, diſcovering a general fact, a phyſical law; and the expreſſion of this aſſemblage is the expreſſion of the phyſical law. And as every obſervation of this conſtancy of fact affords an opportunity for exerting the inſtinctive inference of natural connection between the related ſubjects, every ſuch obſervation is the diſcovery of a power, property, or quality, of natural ſubſtance. And from what has been ſaid, this obſervation of event is all we know of the connection, all we know of the natural power. And when the philoſopher proceeds farther to the arrangement of events, according to their various degrees of complication, he is, *ipſo facto*, making an arrangement of all natural powers according to their various degrees of ſubordinate influence. And thus his occupation is perfectly ſimilar to that of the deſcriptive hiſtorian, claſſification and arrangement; and this conſtitutes all the ſcience attainable by both.

Philoſophy defined.

PHILOSOPHY may therefore be defined, the ſtudy of the phenomena of the univerſe, with a view to diſcover the general laws which indicate the powers of natural ſubſtances, to explain ſubordinate phenomena, and to improve art: Or, in compliance with that natural inſtinct ſo much ſpoken of, Philoſophy is the ſtudy of the phenomena of the univerſe, with a view to diſcover their cauſes, to explain ſubordinate phenomena, and to improve art.

The taſk is undoubtedly difficult, and will exerciſe our nobleſt powers. The employment is manly in itſelf, and the reſult of it important. It therefore juſtly merits the appellation of *philoſophy*, although its objects are nowiſe different from what occupy the attention of other men.

46 The employment of the philoſopher.

The employment of the philoſopher, like that of the natural hiſtorian, is threefold; DESCRIPTION, ARRANGEMENT, and REFERENCE; while the objects are not *things* but *events*.

The deſcription, when employed about events, may be more properly termed *hiſtory*. A philoſophical hiſtory of nature conſiſts in a complete or copious enumeration and narration of facts, properly ſelected, cleared of all unneceſſary or extraneous circumſtances, and accurately narrated. This conſtitutes the materials of philoſophy. We cannot give a better example of this branch of philoſophical occupation than aſtronomy.

From the beginning of the Alexandrian ſchool to this day, aſtronomers have been at immenſe pains in obſerving the heavenly bodies, in order to detect their true motions. This has been a work of prodigious difficulty: for the appearances are ſuch as might have been exhibited although the real motions had been extremely different. Not that our ſenſes give us falſe information; but we form haſty, and frequently falſe judgements, from theſe informations; and call thoſe things deceptions of ſenſe, which are in fact errors of judgement. But the true motions have at laſt been diſcovered, and have been deſcribed with ſuch accuracy, that the hiſtory may be conſidered as nearly complete. This is to be found in the uſual ſyſtems of aſtronomy, where the tables contain a moſt accurate and ſynoptical account of the motion; ſo that we can tell with preciſion in what point of the heavens a planet *has been* ſeen at any inſtant that can be named.

Sir Iſaac Newton's Optics is ſuch another perfect model of philoſophical hiſtory, as far as it goes. This part of philoſophy may be called PHENOMENOLOGY.

47 Phenomenology.

Having in this manner obtained the materials of philoſophical deſcription, we muſt put them into a compendious and perſpicuous form, ſo that a general knowledge of the univerſe may be eaſily acquired and firmly retained. This is to be done by claſſification and arrangement, and this claſſification muſt proceed on reſemblances *obſerved* in the events; and the ſubſequent arrangement muſt be regulated by the diſtinctions of which thoſe reſemblances are ſtill ſuſceptible. This aſſemblage of events into groups muſt be expreſſed. They are facts; therefore the expreſſion muſt be propoſitions. Theſe propoſitions muſt be what the logicians call *general* or *abſtract propoſitions;* for they expreſs, not any individual fact of the aſſemblage, but that circumſtance in which they all reſemble. Such propoſitions are the following: Proof is accompanied by belief; kindneſs is accompanied by gratitude; impulſe is accompanied by motion. Theſe are uſually called *general facts;* but there are none ſuch; every fact is individual. This language, however inaccurate, is very ſafe from miſconſtruction, and we may uſe it without ſcruple. Theſe propoſitions are NATURAL OR PHYSICAL LAWS; and then the detecting and marking thoſe reſemblances in event, is the inveſtigation of phyſical laws; and we may denominate this employment of the philoſopher INVESTIGATION.

48 Inveſtigation.

In the proſecution of this taſk, it will be found that the ſimilarities of fact are of various extent: and thus we ſhall form phyſical laws of various extent; and we ſhall alſo find that ſome are ſubordinate to others; for the reſemblance of a number of facts in one circumſtance does not hinder a part of them from alſo reſembling in another circumſtance: and thus we ſhall find ſubordinations of fact in the ſame way as of quieſcent qualities. And it is found here, as in natural hiſtory, that our aſſemblage of reſembling events will be the more extenſive as the number of reſembling circumſtances is ſmaller; and thus we ſhall have kingdoms, claſſes, orders, genera, and ſpecies of phenomena, which are expreſſed by phyſical laws of all thoſe different ranks.

It has been already obſerved, that this obſervation of phyſical laws is always accompanied by a reference of that uniformity of event to a natural bond of union between the concomitant facts which is conceived by us as the *cauſe* of this concomitancy; and therefore this procedure of the philoſopher is conſidered as the diſcovery of thoſe cauſes, that is, the diſcovery of thoſe powers of natural ſubſtances which conſtitute their phyſical relations, and may juſtly be called their diſtinguiſhing *qualities* or *properties*. This view of the matter gives riſe to a new nomenclature and language. We give to thoſe powers generic names, ſuch as *ſenſibility*, *intelligence*, *irritability*, *gravity*, *elaſticity*, *fluidity*, *magnetiſm*, &c. Theſe terms, without exception, mark reſembling circumſtances of event; and no other definition can be given of them but a deſcription of theſe circumſtances. In a few caſes which have been the ſubjects of more painful or refined diſcuſſion, we have proceeded farther in this abbreviation of language.

We have framed the verb "to gravitate," and the verbal noun "gravitation," which purely expreſſes the fact, the phenomenon; but is conceived to expreſs the *operation* or energy of the cauſe or natural power. It is of importance to keep in mind this metaphyſical remark on theſe terms; for a want of attention to the pure meaning of the words has frequently occaſioned very great miſtakes in philoſophical ſcience.

49 Aitiology.

We may with propriety call this part of the philoſopher's employment AITIOLOGY.

We ſhall give an inſtance of its moſt ſucceſsful application to the claſs of events already adduced as an example of philoſophic hiſtory or phenomenology.

Kepler, a celebrated Pruſſian aſtronomer, having maturely conſidered the phenomena recorded in the tables and obſervations of his predeceſſors, diſcovered, amidſt all the varieties of the planetary motions, three circumſtances of reſemblance, which are now known by the name of *Kepler's laws*.

50 Kepler's laws an inſtance.

1. All the planets deſcribe ellipſes, having the ſun in one focus.

2. The elliptic areas deſcribed by a planet in the different parts of its orbit, are proportional to the times of deſcription.

3. The ſquares of the periodic times are proportional to the cubes of the mean diſtances from the ſun.

View of Bacon's Philoſophy.

By this obſervation or diſcovery, the ſtudy of the planetary motions was greatly promoted, and the calculation of their appearances was now made with a facility and an accuracy which ſurpaſſed all hopes: for the calculation of the place of a planet at any propoſed inſtant was reduced to the geometrical problem of cutting off an area from an ellipſe of known dimenſions, which ſhould bear the ſame proportion to the whole area, as the time for whoſe duration the motion is required, has to the known time of a complete revolution.

51 Comprehended under one more general law,

Long after this diſcovery of Kepler, Sir Iſaac Newton found that theſe laws of Kepler were only particular caſes of a fact or law ſtill more general. He found that the deflections of the planets from uniform rectilineal motion were all directed to the ſun; and that the ſimultaneous deflections were inverſely proportional to the ſquares of the diſtances from that body.

Thus was eſtabliſhed a phyſical law of vaſt extent: but further obſervation ſhowed him, that the motion of every body of the ſolar ſyſtem was compounded of an original motion of projection, combined with a deflection towards every other body; and that the ſimultaneous deflections were proportional to the quantity of matter in the body towards which they were directed, and to the reciprocal of the ſquare of the diſtance from it. Thus was the law made ſtill more general. He did not ſtop here. He compared the deflection of the moon in her orbit with the ſimultaneous deflection of a ſtone thrown from the hand, and deſcribing a parabola; and he found that they followed the ſame law, that is, that the deflection of the moon in a ſecond, was to that of the ſtone in the ſame time, as the ſquare of the ſtone's diſtance from the centre of the earth, to the ſquare of the moon's diſtance from it. Hence he concluded, that the deflection of a ſtone from a ſtraight line was juſt a particular inſtance of the deflections which took place through the whole ſolar ſyſtem.

52 called *gravitation.*

The deflection of a ſtone is one of the indications it gives of its being *gravis* or heavy; whence he calls it *gravitation.* He therefore expreſſes the phyſical law which obtains through the whole ſolar ſyſtem, by ſaying that "every body *gravitates* to every other body; and the gravitations are proportional to the quantity of matter in that other body, and inverſely proportional to the ſquare of the diſtance from it."

Thus we ſee how the arrangement of the celeſtial phenomena terminated in the diſcovery of phyſical laws; and that the expreſſion of this arrangement is the law itſelf.

Since the fall of a heavy body is one inſtance of the phyſical law, and ſince this fall is conſidered by all as the effect of its *weight*, and this weight is conſidered as the cauſe of the fall, the ſame cauſe is aſſigned for all the deflections obſerved in the ſolar ſyſtem; and all the matter in it is found to be under the influence of this cauſe, or to be heavy; and thus this doctrine has been denominated the *ſyſtem of univerſal gravitation.*

Philoſophers have gone farther, and have ſuppoſed that gravity is a power, property, or quality, reſiding in all the bodies of the ſolar ſyſtem. Sir Iſaac Newton does not expreſsly ſay ſo, at leaſt in that work where he gives an account of theſe diſcoveries. He contents himſelf with the immediate conſequence of the firſt axiom in natural philoſophy, viz. that every body remains in a ſtate of reſt, or of uniform rectilineal motion, unleſs affected by ſome moving force. Since the bodies of the ſolar ſyſtem are neither in a ſtate of reſt, nor of uniform rectilineal motion, they muſt be continually deflected; that is, that there operates on every one of them a moving force, directed towards all the others, and having the proportions obſerved in the deflection.

53 [illegible] this law under impulſe,

Other philoſophers have endeavoured to ſhow, that this general fact, detected by Sir Iſaac Newton, is included in another ſtill more general, viz. that every body moves which is impelled by another body in motion. They aſſert, that all the bodies of the ſolar ſyſtem are continually impelled by a fluid which they call *ether*, which is moving in all places, and in all directions, or in circular vortices, and hurries along with it the planets and all heavy bodies. It would ſeem that the familiarity of motion produced by impulſe, at leaſt in thoſe inſtances in which our own exertions are moſt employed, has induced philoſophers to adopt ſuch notions; perhaps, too, they are influenced by an obſcure and indiſtinct notion affixed to the term action, as applied to changes in the material world, and which has given riſe to an axiom, "that a body cannot act at a diſtance, or where it is not;" and thus have thought themſelves obliged to look out for an immediate and contiguous agent in all thoſe phenomena.

54 [illegible] impulſe itſelf [illegible] obſerved.

But the philoſophers who profeſs to be moſt ſcrupulous in their adherence to the rules of philoſophic diſcuſſion, deny the legitimacy of this pretended inveſtigation of cauſes, ſaying that this doctrine is in direct oppoſition to the procedure of the mind in acquiring the knowledge of cauſes. Since the *fact* of impulſe is not really *obſerved* in the celeſtial deflections, nor in the motions of heavy bodies, the law cannot be *inferred*. They ſay that it is not even neceſſary to ſhow that the phenomena of the celeſtial motions are unlike the phenomena of impulſe, although this can be done in the completeſt manner. It is enough that neither the fluid nor the impulſe are obſerved; and therefore they are in the right when they aſſert, that there is inherent in, or accompanies all the bodies of the ſyſtem, a power by which they deflect to one another. See OPTICS.

The debate is foreign to our preſent purpoſe, which is only to ſhow how the obſervation and arrangement of phenomena terminates in the diſcovery of their cauſes, or the diſcovery of the powers or properties of natural ſubſtances.

This is a taſk of great difficulty, as it is of great importance. There are two chief cauſes of this difficulty.

1. In moſt of the ſpontaneous phenomena of nature there is a complication of many events, and ſome of them eſcape our obſervation. Attending only to the moſt obvious or remarkable, we conjoin theſe only in our imagination, and are apt to think theſe the [illegible] [illegible] [illegible] are always accompanied by others. Thus it was thought that there reſided in a vibrating chord a power by which the ſenſation of ſound was excited, or that a chord had a ſounding quality. But it appears clearly from obſervation that there is an intermediate ſeries of events interpoſed between the vibration of the chord and the ſenſitive affection of our ear; and therefore, that ſound is not the effect of the vibration of the chord, but of the very laſt event of this ſeries; and this is pure-

pletely demonſtrated by ſhowing that the vibration and the ſound are *not neceſſarily* connected, becauſe they are not *always* connected, but require the interpoſition of air or of ſome other elaſtic body.

Theſe obſervations ſhow the neceſſity of the moſt accurate and minute obſervation of the phenomena, that none of thoſe intermediate events may eſcape us, and we be thus expoſed to the chance of imaginary connections between events which are really far aſunder in the procedure of nature. As the ſtudy has improved, miſtakes of this kind have been corrected; and philoſophers are careful to make their trains of events under one name as ſhort as poſſible. Thus, in medicine, a drug is no longer conſidered as a *ſpecific* remedy for the diſeaſe which is ſometimes cured when it has been uſed, but is denominated by its moſt immediate operation on the animal frame: it is no longer called a *febrifuge*, but a *ſudorific*.

56 Means of inſuring ſucceſs.

2. When many natural powers combine their influence in a ſpontaneous phenomenon of nature, it is frequently very difficult to diſcover what part of the complicated effect is the effect of each; and to ſtate thoſe circumſtances of ſimilarity which are the foundation of a phyſical law, or intitle us to infer the agency of any natural power. The moſt likely method for inſuring ſucceſs in ſuch caſes is to get rid of this complication of event, by putting the ſubject into ſuch a ſituation that the operation of all the known powers of nature ſhall be ſuſpended, or ſo modified as we may perfectly underſtand *their* effects. We can thus appreciate the effects of ſuch as we could neither modify nor ſuſpend, or we can diſcover the exiſtence of a new law, the operation of a new power.

This is called *making an experiment*; and is, of all, the moſt effectual way of advancing in the knowledge of nature, and has been called EXPERIMENTAL PHILOSOPHY.

57 A ſeeming anomaly explained.

It ſeems, however, at firſt ſight, in direct oppoſition to the procedure of nature in forming general laws. Theſe are formed by induction from multitudes of individual facts, and muſt be affirmed to no greater extent than the induction on which they are founded. Yet it is a matter of fact, a phyſical law of human thought, that one ſimple, clear, and unequivocal experiment, gives us the moſt complete confidence in the truth of a general concluſion from it to every ſimilar caſe. Whence this anomaly? It is not an anomaly or contradiction of the general maxim of philoſophical inveſtigation, but the moſt refined application of it. There is no law more general than this, that "Nature is conſtant in all her operations." The judicious and ſimple form of our experiment inſures us (we imagine) in the complete knowledge of all the circumſtances of the event. Upon this ſuppoſition, and this alone, we conſider the experiment as the faithful repreſentative of every poſſible caſe of the conjunction. This will be more minutely conſidered afterwards.

58 Theory or explanation of ſubordinate phenomena.

The laſt branch of philoſophic occupation is the explanation of ſubordinate phenomena. This is nothing more than the referring any particular phenomenon to that claſs in which it is included; or, in the language of philoſophy, it is the pointing out the general law, or that general fact of which the phenomenon is a particular inſtance. Thus the feeling of the obligations of virtue is thought to be explained, when it is ſhown to be a particular caſe of that regard which every perſon has for his deareſt intereſts. The riſe of water in pumps is explained, when we ſhow it to be a particular caſe of the preſſure of fluids, or of the air. The general law under which we ſhow it to be properly arranged is called the PRINCIPLE of the explanation, and the explanation itſelf is called the THEORY of the phenomenon. Thus Euler's explanation of the lunar irregularities is called a theory of the lunar motions on the principle of gravitation.

This may be done either in order to advance our own knowledge of nature, or to communicate it to others. If done with the firſt view, we muſt examine the phenomenon minutely, and endeavour to detect every circumſtance in it, and thus diſcover all the known laws of nature which concur in its production; we then appreciate the operation of each according to the circumſtances of its exertion; we then combine all theſe, and compare the reſult with the phenomenon. If they are ſimilar, we have explained the phenomenon. We cannot give a better example than Franklin's explanation of the phenomena of thunder and lightning. See LIGHTNING, and ELECTRICITY *Index*.

If we explain a phenomenon from known principles, we proceed ſynthetically from the general law already eſtabliſhed and *known* to exert its influence in the preſent inſtance. We ſtate this influence both in kind and degree according to the circumſtances of the caſe; and having combined them, we compare the reſult with the phenomenon, and ſhow their agreement, and thus it is explained. Thus, becauſe all the bodies of the ſolar ſyſtem mutually gravitate, the moon gravitates to the ſun as well as to the earth, and is continually, and in a certain determinate manner, deflected from that path which ſhe would deſcribe did ſhe gravitate only to the earth. Her motion round the earth will be retarded during the firſt and third quarters of her orbit, and accelerated during the ſecond and fourth. Her orbit and her period will be increaſed during our winter, and diminiſhed during our ſummer. Her apogee will advance, and her nodes will recede; and the inclination of her orbit will be greateſt when the nodes are in ſyzigee, and leaſt when they are in quadrature. And all theſe variations will be in certain preciſe degrees. Then we ſhow that all theſe things actually obtain in the lunar motions, and they are conſidered as explained.

This ſummary account of the object and employment in all philoſophical diſcuſſion is ſufficient for pointing out its place in the circle of the ſciences, and will ſerve to direct us to the proper methods of proſecuting it with ſucceſs. Events are its object; and they are conſidered as connected with each other by cauſation, which may therefore be called the philoſophical relation of things. The following may be adopted as the fundamental propoſition on which all philoſophical diſcuſſion proceeds, and under which every philoſophical diſcuſſion or diſcovery may be arranged:

59 Fundamental propoſition of philoſophical diſcuſſion

"*Every change that we obſerve in the ſtate or condition of things* IS CONSIDERED BY US *as an effect, indicating the agency, characteriſing the kind, and determining the degree of its* INFERRED *cauſe*."

As thus enounced, this propoſition is evidently a phyſical law of human thought. It may be enounced as a neceſſary and independent truth, by ſaying, *every change in the ſtate and condition of things* IS AN EFFECT, &c.

And accordingly it has been so enounced by Dr Reid *; and its title to this denomination has been abundantly supported by him. But we have no occasion to consider it as poſſeſſing this quality. We are ſpeaking of philoſophy, which is ſomething contingent, depending on the exiſtence and conſtitution of an intellectual being ſuch as man; and, in conformity to the view which we have endeavoured to give of human knowledge in the ſubjects of philoſophical relation, it is quite ſufficient for our purpoſe that we maintain its title to the rank of an univerſal law of human thought. This will make it a firſt principle, even although it may not be a neceſſary truth.

All the proof neceſſary for this purpoſe is univerſality of fact; and we believe this to be without exception. We are not to expect that all mankind have made, or will ever make, a formal declaration of their opinion; but we may venture to ſay that all have made it, and continually do make it, virtually. What have the philoſophers of all ages been employed about but the diſcovery of the cauſes of thoſe changes that are inceſſantly going on? *Nil turpius physico*, ſays Cicero, *quam fieri ſine cauſa quidquam dicere*. Human curioſity has been directed to nothing ſo powerfully and ſo conſtantly as to this. Many abſurd cauſes have been aſſigned for the phenomena of the univerſe; but no ſet of men have ever ſaid that they happened without a cauſe. This is ſo repugnant to all our propenſities and inſtincts, that even the atheiſtical ſect, who, of all others, would have profited moſt by the doctrine, have never thought of advancing it. To avoid ſo ſhocking an abſurdity, they have rather allowed that chance, that the concourſe of atoms, are the cauſes of the beautiful arrangements of nature. The thoughtleſs vulgar are no leſs ſolicitous than the philoſophers to diſcover the cauſe of things; and the poet expreſſes the natural and inſtinctive paſſion of all men, when he ſays,

Felix qui potuit rerum cognoſcere cauſas.

And this anxiety is not to nouriſh, but to get rid of ſuperſtitious fears: for thus

—— *metus omnes, et inexorabile fatum*
Subjecit pedibus, ſtrepitumque Acherontis avari.

Had men never ſpeculated, their conduct alone gives ſufficient evidence of the univerſality of the opinion. The whole conduct of man is regulated by it, nay almoſt wholly proceeds upon it, in the moſt important matters, and where experience ſeems to leave us in doubt: and to act otherwiſe, as if any thing whatever happened without a cauſe, would be a declaration of inſanity. Dr Reid has beautifully illuſtrated this truth, by obſerving, that even a child will laugh at you if you try to perſuade him that the top, which he miſſes from the place where he left it, was taken away by nobody. You may perſuade him that it was taken away by a fairy or a ſpirit; but he believes no more about this nobody, than the maſter of the houſe when *he* is told that nobody was the author of any piece of theft or miſchief. What opinion would be formed, ſays Dr Reid, of the intellects of the juryman, on a trial for murder by perſons unknown, who ſhould ſay that the fractured ſkull, the watch and money gone, and other like circumſtances, might poſſibly have no cauſe? he would be pronounced inſane or corrupted

Hume's [illegible]

We believe that Mr Hume [illegible] has ventured to call the truth of this opinion in queſtion; and even he does it only in the way of mere [illegible]. He acknowledges the prevalence of the opinion, and he only objects to the foundation [illegible]; he objects to it merely becauſe it does not [illegible] his theory of belief; and therefore [illegible] ſome men may have no ſuch opinion. But it muſt be obſerved on this occaſion, that the opinion of a philoſopher is of no greater weight in a caſe like this than that of a ploughman. If it be a real principle, directing the opinions and actions of all, it muſt operate on the minds of all. The philoſopher is the only perſon who may chance to be without it: for it requires much labour, and long habits of [illegible], to keep out natural ſentiments; and experience ſhows us that they may be warped if we are at ſufficient pains. It is alſo worthy of remark, that this philoſopher ſeems as much under the influence of this law as ordinary mortals. It is only when he is aware of its not tallying with his other doctrines that his ſcepticiſm appears. Obſerve how he ſpeaks when off his guard. "As to thoſe impreſſions which ariſe from the ſenſes, their ultimate cauſe is, in my opinion, perfectly inexplicable by human reaſon; and it will always be impoſſible to decide with certainty whether they ariſe immediately from the object, are produced by the creative power of the mind, or are derived from the Author of our being."

[illegible] inconſiſtency.

Among theſe alternatives, he never thinks of their not being derived from any cauſe.

The propoſition a firſt principle incapable of proof.

But it is not enough to ſhow that this is a phyſical law of the human mind: we have aſſumed it as a firſt principle, the foundation of a whole theory; therefore not included in or derived from any other more general. Mr Hume's endeavours to prove that it is not a neceſſary truth, ſhow with ſufficient evidence that moſt attempts to derive it in the way of argument are *petitiones principii*; a thing very common in [illegible] attempts to prove firſt principles. It cannot be proved by induction of facts that every event has a cauſe, becauſe induction always ſuppoſes an obſerved fact or event. Now in by far the greateſt number of events the cauſes are unknown. Perhaps in no event whatever do we know the real cauſe, or that power or energy which, without any intervention, produces the effect. No man can ſay, that in the ſimpleſt event which he ever obſerved, he was fully appriſed of every circumſtance which concurred to its production. We ſuppoſe that no event in nature can be adduced more ſimple than the motion of a ſuſpended glaſs ball, when gently ſtruck by another glaſs ball; and we imagine that moſt of our readers will ſay that he perfectly ſees every thing which happens in this phenomenon. We believe, too, that moſt of our readers are of opinion that a body is never put in motion but by the impulſe of another, except in the caſes of animal motion; and that they are diſpoſed to imagine that magnets put iron in motion, and that [illegible] by means of an [illegible] though [illegible]. Now [illegible] readers, that [illegible] the ſtroke [illegible] ſmart indeed as to ſhatter the glaſs ball, the [illegible] the ſuſpended ball was produced [illegible]; that is, the two balls were not in contact [illegible] and the diſtance between them [illegible]

quantity

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* Eſſays on the Intellectual Powers of Man.

[illegible] part of an inch, and probably much greater. We can ſay farther, that it is not certain that even the moſt violent ſtroke, ſuch as would ſhatter them to pieces, is enough to bring them into real contact. The proofs of this ſingular poſition are too long for this place; but the evidence will be ſufficiently ſeen by conſulting the article OPTICS.

Unleſs, therefore, our readers are willing to allow that the ſuſpended ball was put in motion by a repulſive force inherent in one or both balls, they muſt acknowledge that they *do not* fully know all the circumſtances of this ſo ſimple phenomenon, or all the train of events which happen in it; and therefore they are reduced to the neceſſity of *ſuppoſing*, although they do not ſee it, an intervening fluid or matter, by the immediate action of whoſe *adjoining* particles the motion is produced.

This being the caſe in the ſimpleſt phenomenon that we can think upon, what ſhall we ſay of the numberleſs multitudes which are incomparably more complex: Muſt we not acknowledge that the efficient cauſes, even in the vulgar ſenſe of the word, the immediately preceding events, are unknown, becauſe the conjunctions are not obſerved? and therefore it cannot be ſaid that it is from experimental induction that this truth gains univerſal belief. Experience, ſo far from ſupporting it as a direct proof, ſeems rather the ſtrongeſt argument againſt it; for we have no experiment of unqueſtionable authority but the narrow circle of our own power exerted on our thoughts and actions. And even here there are perhaps caſes of change where we cannot ſay with certainty that we perceive the efficient cauſe.

Nothing ſeems to remain, therefore, but to allow that this phyſical law of human judgement is inſtinctive, a conſtituent of the human ſoul, a firſt principle; and incapable of any other proof than the appeal to the feelings of every man.

63
Cauſes not obſerved but inferred from the phenomena which are the language of nature.

Simply to ſay, that every change is conſidered as an effect, is not giving the whole characters of this phyſical law. The cauſe is not always, perhaps never, *obſerved*, but is *inferred* from the phenomena. The inference is therefore in every inſtance dependant on the phenomenon. The phenomenon is to us the language of nature: It is therefore the ſole indication of the cauſe and of its agency: it is therefore the indication of the very cauſe, and of no other. The obſerved change therefore characteriſes the cauſe, and marks its kind. This is confirmed by every word of philoſophical language, where, as has already been obſerved, the names of the inferred powers of nature are nothing but either abbreviated deſcriptions of the phenomena, or terms which are defined ſolely by ſuch deſcriptions. In like manner, the phenomenon determines the cauſe in a *particular degree*, and in no other; and we have no immediate meaſure of the degree of the cauſe but the phenomenon itſelf. We take many meaſures of the cauſe, it is true; but on examination they will be found not to be immediate meaſures of the cauſe, but of the effect. Aſſuming gravitation as the cauſe of the planetary deviations from uniform rectilineal motion, we ſay that the gravitation of the moon is but $\frac{1}{3600}$th part of the gravitation of a ſtone thrown from the hand: but we ſay this only from obſerving that the deflection of the ſtone is 3600 times greater than the ſimultaneous deflection of the moon. In ſhort, our whole knowledge of the cauſe is not only *founded* on our knowledge of the phenomenon, but *it is the ſame*. This will be found a remark of immenſe conſequence in the proſecution of philoſophical reſearches; and a ſtrict attention to it will not only guard us againſt a thouſand miſtakes into which the reaſoning pride of man would continually lead us, but will alſo enable us fully to detect many egregious and fatal blunders made in conſequence of this philoſophical vanity. Nothing can be more evident than that whenever we are puzzled, it would be folly to continue groping among thoſe obſcure beings called *cauſes*, when we have their prototypes, the phenomena themſelves, in our hands.

View of Bacon's Philoſophy.

Such is the account which may be given of philoſophy, the ſtudy of the works of God, as related by cauſation. It is of vaſt extent, reaching from an atom to the glorious Author of the Univerſe, and contemplating the whole connected chain of intelligent, ſenſitive, and inanimate beings. The philoſopher makes uſe of the deſcriptions and arrangements of the natural hiſtorian as of mighty uſe to himſelf in the beginning of his career; confiding in the uniformity of nature, and expecting that ſimilarity in the quieſcent properties of things will be accompanied by ſome reſemblances in thoſe more important properties which conſtitute their mutual dependences, linking them together in a great and endleſsly ramified chain of events.

We have endeavoured to aſcertain with preciſion the peculiar province of philoſophy, both by means of its object and its mode of procedure. After this it will not require many words to point out the methods for proſecuting the ſtudy with expedition and with ſucceſs. The rules of philoſophizing, which Newton premiſes to his account of the planetary motions, which he ſo ſcrupulouſly followed, and with a ſucceſs which gives them great authority, are all in ſtrict conformity to the view we have now given of the ſubject.

64
The chief rule of philoſophizing explained

The chief rule is, that ſimilar cauſes are to be aſſigned to ſimilar phenomena. This is indeed the ſource of all our knowledge of connected nature; and without it the univerſe would only preſent to us an incomprehenſible chaos. It is by no means, however, neceſſary to enjoin this as a maxim for our procedure: it is an inſtinctive propenſity of the human mind. It is abſolutely neceſſary, on the contrary, to caution us in the application of this propenſity. We muſt be extremely confident in the certainty of the reſemblance before we venture to make any inference. We are prone to reaſon from analogy: the very employment is agreeable; and we are ever diſpoſed to embrace opportunities of engaging in it. For this reaſon we are ſatisfied with very ſlight reſemblances, and eagerly run over the conſequences, as if the reſemblances were complete; and our reſearches frequently terminate in falſehood.

This propenſity to analogical reaſoning is aided by another equally ſtrong, and equally uſeful, when properly directed; we mean the propenſity to form general laws: it is in fact a propenſity to diſcover *cauſes*, which is equivalent to the eſtabliſhing of general laws. It appears in another form, and is called a love of or taſte for ſimplicity; and this is encouraged or juſtified as agreeable to the uniformity and ſimplicity of nature. "Natura ſemper ſibi ſimilis et conſona," ſays Newton; "Fruſtra fit per plura, quod fieri poteſt per pauciora," ſays another. The beautiful, the wiſe economy of nature, are phraſes in every body's mouth; and Newton enjoins us to adopt no more cauſes than are ſufficient to explain

View of [illegible]

explain the phenomena. All this is very well, and is true in a certain degree; but it is too frequently the ſubterfuge of human vanity and ſelf love. This inordinate admiration of the economy and ſimplicity of nature is generally connected with a manifeſt love of ſyſtem, and with the actual production of ſome new ſyſtem, where from one general principle ſome extenſive theory or explanation is deduced and offered to the world. The author ſees *a ſort* of reſemblance between a certain ſeries of phenomena and the conſequences of ſome principle, and thinks the principle adequate to their explanation. Then, on the authority of the acknowledged ſimplicity of nature, he inſtantly excludes all other principles of explanation: "becauſe," ſays he, this principle is ſufficient "et fruſtra fit per plura," &c. We could point out many inſtances of this kind in the writings of perhaps the firſt mathematician and the pooreſt philoſopher of the century; whoſe extenſive theories are thus evidently exhibited, which a few years examination have ſhown to be nothing but analogies, indiſtinctly obſerved, and, what is worſe, inaccurately applied.

To regulate theſe hazardous propenſities, and keep philoſophers in the right path, Newton inculcates another rule, or rather gives a modification of this injunction of [illegible]. He enjoins, that no cauſe ſhall be admitted but what is real. His words are, that *no cauſes ſhall be admitted but ſuch as are true, and ſufficient to account for the phenomena.* We apprehend that the meaning of this rule has been miſtaken by many philoſophers, who imagine that by *true* he means cauſes which really exiſt in nature, and are not mere creatures of the imagination. We have met with ſome who would boggle at the doctrines of Ariſtotle reſpecting the planetary motions, viz. that they are carried along by conducting intelligent minds, becauſe we know of *no ſuch* in the univerſe; [illegible] think the doctrine of the Carteſian vortices deſerving of at leaſt an examination, becauſe we ſee ſuch vortices exiſt, and produce effects which have ſome reſemblance to the planetary motions, and have juſtly rejected them. [illegible] this [illegible] has been very imperfect. We apprehend Newton's meaning by theſe words is, that no cauſe of any event ſhall be admitted, or even conſidered, which we *do not know* to be actually concurring or exerting ſome influence *in that very event*. If this be his meaning, he would reject the Carteſian vortices, and the conducting ſpirits of Ariſtotle for one and the ſame reaſon; not becauſe they were not adequate to the explanation, nor becauſe ſuch cauſes do not exiſt in nature, but becauſe we did not *ſee them* anyhow concerned in the phenomenon under conſideration. We neither ſee a ſpirit nor a vortex, and therefore need not trouble ourſelves with enquiring what effects they would produce. Now we know that this was his very conduct, and what has diſtinguiſhed him from all philoſophers who preceded him, though many, by following his example, have alſo been rewarded by ſimilar ſucceſs. This has procured to Newton the character of [illegible] philoſopher; and modeſt his [illegible] may, for diſtinction's ſake, be called, becauſe the contrary procedure of others did not originate ſo much from ignorance as from vanity. Newton's conduct in this was not modeſty, but ſagacity, prudence, caution, and to ſay it purely, it was ſound judgement.

In the ſtudy of nature, he ſuppoſed philoſophical cauſes are not [illegible] phenomena. When [illegible] ly when they are [illegible] ries of cauſes, [illegible] natural [illegible] but when one of [illegible] ſeen, [illegible] any [illegible]. [illegible] cover in the ſolar ſyſtem, that all bodies were [illegible] to all other bodies, according to certain regulations of diſtance and quantity of matter. When [illegible] had done nothing in philoſophy, [illegible] no cauſe, [illegible] this deflection [illegible] ſaid, [illegible] no more than he had told them; that he ſaw nothing cauſing this deflection; [illegible] deſcribed it ſo [illegible] now make [illegible] he pleaſed, and [illegible] purpoſe of [illegible] plicity [illegible]. And when philoſophers [illegible] tical fluids and vortices which would produce theſe deflections, he contented himſelf with ſhowing the total inconſiſtency of theſe explanations with the [illegible] principles acknowledged by their authors; ſhowing that they had tranſgreſſed both parts of his rule, their [illegible] neither being real nor ſufficient for explaining the phenomena. A cauſe is ſufficient for explaining a phenomenon only when its legitimate conſequences are perfectly agreeable to theſe phenomena.

Newton's diſcoveries remain without any diminution or change: no philoſopher has yet advanced a ſtep farther.

But let not the authority, or even the ſucceſs, of Newton be our guide. Is his rule founded in reaſon? It ſurely is. For if philoſophy be only the interpretation of nature's language, the inference of cauſes from the phenomena, a fancied or hypothetical phenomenon can produce nothing but a fanciful cauſe, and can make no addition to our knowledge of real nature.

All hypotheſes therefore muſt be baniſhed from philoſophical diſcuſſion as frivolous and uſeleſs, adminiſtering to vanity alone. As the explanation of any appearance is nothing but the pointing out the general fact, of which this is a particular inſtance, hypotheſis can give no explanation: knowing nothing of cauſe and effect but the conjunction of two events, we ſee nothing of conjunction when one of the events is hypothetical. Although all the legitimate conſequences of a hypothetical principle ſhould be perfectly ſimilar to the phenomena, it is extremely dangerous to aſſume this principle as the real cauſe. [illegible] variety. Nothing is more [illegible] than the [illegible] variety of nature. That the ſame phenomena may be produced by different cauſes [illegible]

[illegible] hypotheſes.

nomers, who muſt all grant, that the appearances of motion will be preciſely the ſame whether the earth moves round the ſun like the other planets, or whether the ſun with his attendant planets moves round the earth; and that the demonſtration of the firſt opinion is had from a fact totally unconnected with all the deductions or even with their cauſes: for it may be aſſerted, that Dr Bradley's diſcovery of the aberration of the fixed ſtars, in conſequence of the progreſſive motion of light, was the firſt thing which put the Copernican ſyſtem beyond queſtion; and even this is ſtill capable of being explained in another way. The Author of Nature ſeems to delight in variety; and there cannot be named a ſingle purpoſe on which the moſt inconceivable fertility in reſource is not obſerved. It is the moſt delightful occupation of the curious mind and the ſenſible heart to contemplate the various contrivances of nature in accompliſhing ſimilar ends.

As a principle therefore on which to found any maxim of philoſophical procedure, this is not only injudicious, becauſe imprudent and *apt* to miſlead, but as falſe, and almoſt ſure to miſlead. In conformity to this obſervation, it muſt be added, that nothing has done ſo much harm in philoſophy as the introduction of hypotheſes.

Authors have commonly been ſatisfied with very ſlight reſemblances, and readers are eaſily miſled by the appearances of reaſoning which theſe reſemblances have countenanced. The ancients, and above all Ariſtotle, were much given to this mode of explanation, and have filled philoſophy with abſurdities. The ſlighteſt reſemblances were with them ſufficient foundations of theories. It has been by very ſlow degrees that men have learned caution in this reſpect; and we are ſorry to ſay that we are not yet cured of the diſeaſe of hypothetical ſyſtematizing, and to ſee attempts made by ingenious men to bring the frivolous theories of antiquity again into credit. Nay, modern philoſophers even of the greateſt name are by no means exempted from the reproach of hypothetical theories. Their writings abound in ethers, nervous fluids, animal ſpirits, vortices, vibrations, and other inviſible agents. We may affirm that all theſe attempts may be ſhown to be either unintelligible, fruitleſs, or falſe. Either the hypotheſis has been ſuch that no conſequence can be diſtinctly drawn from it, on account of its obſcurity and total want of reſemblance to any thing we know; or the juſt and legitimate conſequences of the hypotheſis are inconſiſtent with the phenomena (x). This is remarkably the caſe in the hypotheſes which have been introduced for the explanation of the mechanical phenomena of the univerſe. Theſe can be examined by accurate ſcience, and the conſequences compared without any miſtake; and nothing elſe but a perfect agreement ſhould induce us even to liſten to any hypotheſis whatever.

It may here be aſked, Whether, in the caſe of the moſt perfect agreement, after the moſt extenſive compariſon, the hypotheſis ſhould be admitted? We believe that this muſt be left to the feelings of the mind. When the belief is irreſiſtible, we can reaſon no more. But as there is no impoſſibility of as perfect an agreement with ſome other hypotheſis, it is evident that it does not convey an irrefragable title to our hypotheſis. It is ſaid, that ſuch an agreement authoriſes the reception of the hypothetical theory in the ſame manner as we *muſt* admit that to be the *true* cypher of a letter which will make perfect ſenſe of it. But this is not true: in decyphering a letter we know the ſounds which *muſt* be repreſented by the characters, and that they are really the conſtituents of ſpeech: but in hypothetical explanations the firſt principle is not known to exiſt; nay, it is poſſible to make two cyphers, each of which ſhall give a meaning to the letter. Inſtances of this are to be ſeen in treatiſes on the art of decyphering; and there has been lately diſcovered a national character (the *ogam* diſcovered in Ireland) which has this property.

We conclude our criticiſm on hypothetical explanations with this obſervation, that it is *impoſſible* that they can give any addition of knowledge. In every hypotheſis we thruſt in an intermediate event between the phenomenon and ſome general law; and this event is not ſeen, but ſuppoſed. Therefore, according to the true maxims of philoſophical inveſtigation, we give no explanation; for we are not by this means enabled to aſſign the general law in which this particular phenomenon is included: nay, the hypotheſis makes no addition to our liſt of general laws; for our hypotheſes muſt be *ſelected*, in order to tally with all the phenomena. The hypotheſis therefore is underſtood only *by* and *in* the phenomena; and it muſt not be made more general than the phenomena themſelves. The hypotheſis gives no generaliſation of facts. Its very application is founded on a great coincidence of facts; and the hypothetical fact is thruſt in between two which we really obſerve to be united by nature. The applicability therefore of the hypotheſis

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(x) It has often been matter of amuſement to us to examine the hypothetical theories of ingenious men, and to obſerve the power of nature even when we are tranſgreſſing her commands, *Naturam expellat furca, tamen uſque revertitur*. The hypotheſis of an ingenious man is framed in perfect conformity to nature's dictates: for you will find that the hypothetical cauſe is touched and retouched, like the firſt ſitting of a picture, till it is made to reſemble the phenomena, and the cauſe is ſtill inferred, nay explained, in ſpite of all his ingenuity, from the phenomenon; and then, inſtead of deſiring the ſpectators to pay him his due praiſe, by ſaying that the picture is like the man, he inſiſts that they ſhall ſay, what gives him no credit, that the man is like the picture. But alas: this is ſeldom the caſe: The picture is generally an anamorphoſis, unlike any thing extant in nature, and having parts totally incongruous. We have ſeen ſuch pictures, where a wood is ſtanding on the ſea, and an eye is on the end of an elephant's trunk: and yet when this was viewed through a proper glaſs, the wood became an eyebrow to the eye, and the proboſcis was a very pretty ringlet of hair. We beg indulgence for this piece of levity, becauſe it is a moſt appoſite illuſtration of a hypothetical theory. The reſemblance between the principle and phenomenon is true only in detached unconnected ſcraps, and the principle itſelf is an incongruous patchwork. But by a perverſion of the rules of logic, all theſe inconſiſtencies are put out of view, and the explanation is ſomething like the phenomenon.

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hypotheſis is not more extenſive than the ſimilarity of facts which we obſerve, and the hypothetical law is not more general than the obſerved law. Let us then throw away entirely the hypothetical law, and inſert the obſerved one in our liſt of general laws: it will be in different language from the hypothetical law, but it will expreſs the ſame facts in nature.

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On what occaſions they may be uſeful.

It is in experimental philoſophy alone that hypotheſes can have any juſt claim to admiſſion; and here they are not admitted as explanations, but as conjectures ſerving to direct our line of experiments.

Effects only appear; and by their appearance, and the previous information of experience, cauſes are immediately aſcertained by the perfect ſimilarity of the whole train of events to other trains formerly obſerved: Or they are ſuggeſted by more imperfect reſemblances of the phenomena; and theſe ſuggeſtions are made with ſtronger or fainter evidence, according as the reſemblance is more or leſs perfect. Theſe ſuggeſtions do not amount to a confidential inference, and only raiſe a conjecture. Wiſhing to verify or overturn this conjecture, we have recourſe to experiment; and we put the ſubject under conſideration in ſuch a ſituation, that we can ſay what will be the effect of the conjectural cauſe if real. If this tallies with the appearance, our conjecture has more probability of truth, and we vary the ſituation, which will produce a new ſet of effects of the conjectured cauſe, and ſo on. It is evident that the probability of our conjecture will increaſe with the increaſe of the conformity of the legitimate effects of the ſuppoſed cauſe with the phenomena, and that it will be entirely deſtroyed by *one* diſagreement. In this way conjectures have their great uſe, and are the ordinary means by which experimental philoſophy is improved. But conjectural ſyſtems are worſe than nonſenſe, filling the mind with falſe notions of nature, and generally leading us into a courſe of improper conduct when they become principles of action. This is acknowledged even by the abettors of hypothetical ſyſtems themſelves, when employed in overturning thoſe of their predeceſſors, and eſtabliſhing their own: witneſs the ſucceſſive maintainers of the many hypothetical ſyſtems in medicine, which have had their ſhort-lived courſe within theſe two laſt centuries.

Let every perſon therefore who calls himſelf a philoſopher reſolutely determine to reject all temptations to this kind of ſyſtem-making, and let him never conſider any compoſition of this kind as any thing better than the amuſement of an idle hour.

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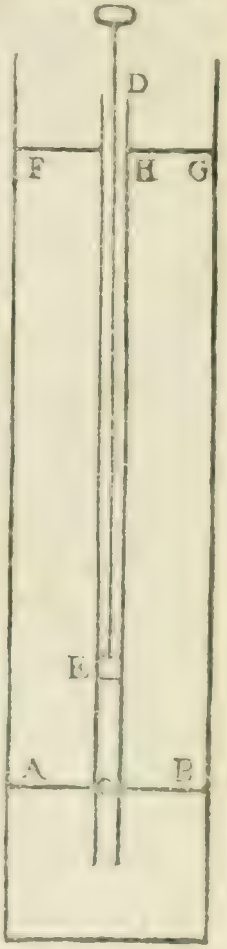
True mode of philoſophical procedure.

After theſe obſervations, it cannot require much diſcuſſion to mark the mode of procedure which will inſure progreſs in all philoſophical inveſtigations.

The ſphere of our intuitive knowledge is very limited: and we muſt be indebted for the greateſt part of our intellectual attainments to our rational powers, and it muſt be deductive. In the ſpontaneous phenomena of nature, whether of mind or body, it ſeldom happens that the energy of that natural power, which is the principle of explanation, is ſo immediately connected with the phenomenon that we ſee the connection at once. Its exertions are frequently concealed, and in all caſes modified, by the joint exertions of other natural powers: the particular exertion of each muſt be conſidered apart, and their mutual connection traced out. It is only in this way that we can diſcover the perhaps long train of intermediate operations, and alſo ſee in what manner and degree the real principle of explanation concurs in the oſtenſible proceſs of nature.

In all ſuch caſes it is evident that our inveſtigation (and inveſtigation it muſt ſtrictly be) muſt proceed by ſteps, conducted by the ſure hand of logical analyſis. To take an inſtance from the moſt familiar example, let us liſten to Galileo while he is teaching his friends the cauſe of the riſe of water in a pump. He ſays that it is owing to the preſſure of the air. This is his principle; and he announces it in all its extent. All matter, ſays he, is heavy, and in particular air is heavy. He then points out the connection of this general principle with the phenomenon. Air being heavy, it muſt be ſupported; it muſt lie and preſs on what ſupports it: it muſt preſs on the ſurface AB of the water in the ciſtern ſurrounding the pipe CD of the pump; and alſo on the water C within this pipe. He then takes notice of another general principle which exerts its ſubordinate influence in this proceſs. Water is a fluid; a fluid is a body whoſe parts yield to the ſmalleſt impreſſion; and, by yielding, are eaſily moved among themſelves: and no little parcel of the fluid can remain at reſt unleſs it be equally preſſed in every direction, but will recede from that ſide where it ſuſtains the greateſt preſſure. In conſequence of this fluidity, *known* to be a property of water, if any part of it is preſſed, the preſſure is propagated through the whole; and if not reſiſted on every ſide, the water will move to that ſide where the propagated preſſure is not reſiſted. All theſe ſubordinate or collateral propoſitions are ſuppoſed to be previouſly demonſtrated or allowed. Water therefore muſt yield to the preſſure of the air which preſſes by it on every ſide, and muſt move to that ſide where it is not withheld by ſome oppoſite preſſure. He then proceeds to ſhew, from the ſtructure of the pump, that there is no oppoſing preſſure on the water in the inſide of the pump. "[illegible] ſuppoſe the piſton thruſt down till it touches the ſurface of the water in the pipe, ſuppoſe the piſton now drawn up by a power ſufficient to lift it, and all the air incumbent on it: [illegible] on the ſurface of the water. [illegible] gentlemen, it appears to me, that the water in the pump is in the ſame ſituation that it would be in were there no air at all, but water poured into the ciſtern to a height AF; ſuch, that the column of water FABG preſſes on the ſurface AB as much as the air does. Now in this caſe we know that the water at C is preſſed up-



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wards with a force equal to the weight of a column of water, having the ſection of the pipe for its baſe and CH for its height. The water below C therefore will be preſſed up into the pipe CD, and will riſe to G, ſo that it is on a level with the external water FG; that is, it will riſe to H. This is a neceſſary conſequence of the weight and preſſure of the incumbent column FABG, and the fluidity of the water in the ciſtern. Conſequences perfectly ſimilar muſt neceſſarily follow from the weight and preſſure of the air; and therefore on drawing up the piſton from the ſurface C of the water, with which it was in contact, the water muſt follow it till it attain that height which will make its own weight a balance for the preſſure of the circumambient air. Accordingly, gentlemen, the Italian plumbers inform me, that a pump will not raiſe water quite fifty palms; and from their information I conclude, that a pillar of water fifty palms high is ſomewhat heavier than a pillar of air of the ſame baſe, and reaching to the top of the atmoſphere."

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The ſynthetic method.

Thus is the phenomenon explained. The riſe of the water in the pump is ſhown to be a particular caſe of the general fact in hydroſtatics, that fluids in communicating veſſels will ſtand at heights which are inverſely as their denſities, or that columns of equal weights are in equilibrio.

This way of proceeding is called arguing *à priori*, the ſynthetic method. It is founded on juſt principles; and the great progreſs which we have made in the mathematical ſciences by this mode of reaſoning ſhows to what length it may be carried with irreſiſtible evidence. It has long been conſidered as the only inlet to true knowledge; and nothing was allowed to be known with certainty which could not be demonſtrated in this way to be true. Accordingly logic, or the art of reaſoning, which was alſo called the art of diſcovering truth, was nothing but a ſet of rules for ſucceſsfully conducting this mode of argument.

Under the direction of this infallible guide, it is not ſurely unreaſonable to expect that philoſophy has made ſure progreſs towards perfection; and as we know that the brighteſt geniuſes of Athens and of Rome were for ages ſolely occupied in philoſophical reſearches in every path of human knowledge, it is equally reaſonable to ſuppoſe that the progreſs has not only been ſure but great. We have ſeen that the explanation of an appearance in nature is nothing but the arrangement of it into that general claſs in which it is comprehended. The claſs has its diſtinguiſhing mark, which, when it is found in the phenomenon under conſideration, fixes it in its claſs, there to remain for ever an addition to our ſtock of knowledge. Nothing can be loſt any other way but by forgetting it; and the doctrines of philoſophers muſt be ſtable like the laws of nature.

We have ſeen, however, that the very reverſe of all this is the caſe; that philoſophy has but very lately emerged from worſe than total darkneſs and ignorance; that what paſſed under the name of philoſophy was nothing but ſyſtems of errors (if ſyſtems they could be called), which were termed doctrines, delivered with the moſt impoſing apparatus of logical demonſtration, but belied in almoſt every inſtance by experience, and affording us no aſſiſtance in the application of the powers of nature to the purpoſes of life. Nor will this excite much wonder in the mind of the enlightened reader of the preſent day, who reflects on the uſe then in this dialectic proceſs was made of the *categories*, and the method in which thoſe categories were formed. From ſuch principles ſo vague in themſelves, and ſo gratuitouſly aſſumed, ingenious men might deduce many different concluſions all equally erroneous: and that this was actually done, no ſurer evidence can be given, than that hardly a lifetime elapſed in which the whole ſyſtem of doctrines which had captivated the minds of the moſt penetrating, have been oftener than once exploded and overturned by another ſyſtem, which flouriſhed for a while, and then was ſupplanted by a third which ſhared the ſame fate. Here was an infallible proof of their error, for inſtability is incompatible with truth.

It is allowed by all that this has been the caſe in thoſe branches of ſtudy at leaſt which contemplate the philoſophical relations of the material world, in aſtronomy, in mechanical philoſophy, in chemiſtry, in phyſiology, in medicine, in agriculture. It is alſo acknowledged, that in the courſe of leſs than two centuries back we have acquired much knowledge on theſe very ſubjects, call it philoſophy, or by what name you will, ſo much more conformable to the natural courſe of things, that the deductions made from it by the ſame rules of the ſynthetic method are more conformable to fact, and therefore better fitted to direct our conduct and improve our powers. It is alſo certain that theſe bodies of doctrine which go by the name of philoſophical ſyſtems, have much more ſtability than in ancient times; and though ſometimes in part ſuperſeded, are ſeldom or never wholly exploded.

This cannot perhaps be affirmed with equal confidence with reſpect to thoſe ſpeculations which have our intellect or propenſities for their object: and we have not perhaps attained ſuch a repreſentation of human nature as will bear compariſon with the original; nor will the legitimate deductions from ſuch doctrines be of much more ſervice to us for directing our conduct than thoſe of ancient times: and while we obſerve this difference between theſe two general claſſes of ſpeculations, we may remark, that it is conjoined with a difference in the manner of conducting the ſtudy. We have proceeded in the old Ariſtotelian method when inveſtigating the nature of mind; but we ſee the material philoſophers running about, paſſing much of their time away from books in the ſhop of the artiſan, or in the open fields engaged in obſervation, labouring with their hands, and buſy with experiments. But the ſpeculatiſt on the intellect and the active powers of the human ſoul ſeems unwilling to be indebted to any thing but his own ingenuity, and his labours are confined to the cloſet. In the firſt claſs, we have met with ſomething like ſucceſs, and we have improved many arts: in the other, it is to be feared that we are not much wiſer, or better, or happier, for all our philoſophic attainments.

71
No inlet to truth.

Here, therefore, muſt ſurely have been ſome great, ſome fatal miſtake. There has indeed been a material defect in our mode of procedure, in the employment of this method of reaſoning as an inlet to truth. The fact is, that philoſophers have totally miſtaken the road of diſcovery, and have pretended to ſet out in their inveſtigation from the very point where this journey ſhould have terminated.

The Ariſtotelian logic, the ſyllogiſtic art, that art ſo much boaſted of as the only inlet to true knowledge,

View of Bacon's Philosophy.

72
But the art of communicating knowledge.

the only means of diſcovery, is in direct oppoſition to the ordinary procedure of nature, by which we every day, and in every action of our lives, acquire knowledge and diſcover truth. It is not the art of diſcovering truth, it is the art of communicating knowledge, and of detecting error. it is nothing more than the application of this maxim, "whatever is true of a whole claſs of objects, is true of each individual of that claſs." This is not a juſt account of the art of diſcovering truth, nor is it a complete account of the art of reaſoning. Reaſoning is the producing belief; and whatever mode of argumentation invariably and irreſiſtibly produces belief, is reaſoning. The ancient logic ſuppoſes that all the firſt principles are already known, and that nothing is wanted but the application of them to particular facts. But were this true, the application of them, as we have already obſerved, can hardly be called a diſcovery; but it is not true; and the fact is, that the firſt principles are generally the chief objects of our reſearch, and that they have come into view only now and then as it were by accident, and never by the labour of the logician. He indeed can tell us whether we have been miſtaken; for if our general principle be true, it muſt influence *every* particular caſe. If, therefore, it be falſe in any one of theſe, it is not a true principle. And it is here that we diſcover the ſource of that fluctuation which is ſo much complained of in philoſophy. The authors of ſyſtems give a ſet of conſecutive propoſitions logically deduced from a firſt principle, which has been haſtily adopted, and has no foundation in nature. This does not hinder the amuſement of framing a ſyſtem from it, nor this ſyſtem from pleaſing by its ſymmetry; and it takes a run: but when ſome officious follower thinks of making ſome uſe of it, which requires the compariſon with experience and obſervation, they are found totally unlike, and the whole fabric muſt be abandoned as unſound: and thus the ſucceſſive ſyſtems were continually puſhing out their predeceſſors, and preſently met with the ſame treatment.

How was this to be remedied? The ratiocination was ſeldom egregiouſly wrong; the ſyllogiſtic art had ere now attained a degree of perfection which left little room for improvement, and was ſo familiarly underſtood by the philoſophical practitioners, that they ſeldom committed any great blunders. Muſt we examine the firſt principles? This was a taſk quite new in ſcience; and there were hardly any rules in the received ſyſtems of logic to direct us to the ſucceſsful performance of it. Ariſtotle, the ſagacious inventor of thoſe rules, had not totally omitted it; but in the fervour of philoſophic ſpeculation he had made little uſe of them. His fertile genius never was at a loſs for firſt principles, which anſwered the purpoſe of verbal diſputation [illegible] much riſk of being belied on account of its diſſimilitude to nature; for there was frequently no prototype with which his ſyſtematic doctrine could be compared. His enthuſiaſtic [illegible] were [illegible] in following his [illegible]; and philoſophy [illegible] in the hands [illegible] the world, [illegible] in the [illegible] of nature, [illegible] men [illegible] [illegible] were [illegible] as well as diſguſted with the [illegible] which [illegible] raiſed expectations by the [illegible] and [illegible] [illegible].

[illegible]

[illegible]

pointed out by nature.

[illegible] her method is the moſt proper for acquiring knowledge, and that by [illegible] [illegible] children, whom we may obſerve continually buſy turning every thing over and over, putting them into every [illegible] ſelves acquainted with ſurrounding objects: they are [illegible] If [illegible] plays, they are eager to repeat it. When a child has [illegible] lie within its reach, it is ſure to ſhare the ſame fate. If the child be indulged in this diverſion, it will repeat it [illegible] of nature; and its occupation is the [illegible] are anxious that this ſimilarity ſhall return. The child, it is true, thinks not of this abſtract object of contemplation, [illegible]

[illegible]

as human nature. It is certainly a method of diſcovery; for by theſe means general principles, formerly unknown, have come into view.

74 Is a juſt logic. It is a juſt and rational logic; for it is founded on, and indeed is only the habitual application of, this maxim, “That whatever is true with reſpect to every individual of a claſs of events, is true of the whole claſs.” This is juſt the inverſe of the maxim on which the Ariſtotelian logic wholly proceeds, and is of equal authority in the court of reaſon. Indeed the expreſſion of the general law is only the abbreviated expreſſion of every particular inſtance.

This new logic, therefore, or the logic of induction, muſt not be conſidered as ſubordinate to the old, or founded on it. See Logic, Part III. chap. 5. In fact, the uſe and legitimacy of the Ariſtotelian logic is founded on the inductive,

All animals are mortal;
All men are animals; therefore
All men are mortal.

This is no argument to any perſon who chooſes to deny the mortality of man; even although he acknowledges his animal nature, he will deny the major propoſition.

It is beſide our purpoſe to ſhow, how a point ſo general, ſo congenial to man, and ſo familiar, remained ſo long unnoticed, although the diſquiſition is curious and ſatisfactory. It was not till within theſe two centuries that the increaſing demand for practical knowledge, particularly in the arts, made inquiſitive men ſee how uſeleſs and inſufficient was the learning of the ſchools in any road of inveſtigation which was connected with life and buſineſs; and obſerve, that ſociety had received uſeful information chiefly from perſons actually engaged in the arts which the ſpeculatiſts were endeavouring to illuſtrate; and that this knowledge conſiſted chiefly of experiments and obſervations, the only contributions which their authors could make to ſcience.

The *Novum Organum* of Bacon, which points out the true method of forming a body of real and uſeful knowledge, namely, the ſtudy of nature in the way of deſcription, obſervation, and experiment, is undoubtedly the nobleſt preſent that ſcience ever received. It may be conſidered as the grammar of nature's language, and is a counter-part to the logic of Ariſtotle; not exploding it, but making it effectual.

75 Its chief rule As the logic of Ariſtotle had its rules, ſo has the Baconian or inductive; and this work, the *Novum Organum Scientiarum*, contains them all. The chief rule, and indeed the rule from which all the reſt are but derivations, is, that “the induction of particulars muſt be carried as far as the general affirmation which is deduced from them.”

76 for diſcovering general principles, If this be not attended to, the mind of man, which from his earlieſt years ſhows great eagerneſs in ſearching for firſt principles, will frequently aſcribe to the operation of a general principle events which are merely accidental. Hence the popular belief in omens, palmiſtry, and all kinds of fortune-telling.

This rule muſt evidently give a new turn to the whole track of philoſophical inveſtigation. In order to diſcover firſt principles, we muſt make extenſive and accurate obſervations, ſo as to have copious inductions of facts, that we may not be deceived as to the extent of the principle inferred from them. We muſt extend our acquaintance with the phenomena, paying a minute attention to what is going on all around us; and we muſt ſtudy nature, not ſhut up in our cloſet drawing the picture from our own fancy, but in the world, copying our lines from her own features.

To delineate human nature, we muſt ſee how men act. To give the philoſophy of the material world, we muſt notice its phenomena.

This method of ſtudying nature has been proſecuted during theſe two laſt centuries with great eagerneſs and ſucceſs. Philoſophers have been buſy in making accurate obſervations of facts, and copious collections of them. Men of genius have diſcovered points of reſemblance, from which they have been able to infer many general powers both of mind and body; and reſemblances among theſe have ſuggeſted powers ſtill more general.

By theſe efforts inveſtigation became familiar; philoſophers ſtudied the rules of the art, and became more expert; hypotheſes were baniſhed, and nothing was admitted as a principle which was not inferred from the moſt copious induction. Concluſions from ſuch principles became every day more conformable to experience. Miſtakes ſometimes happened; but recourſe being had to more accurate obſervation or more copious induction, the miſtakes were corrected.

77 and rectifying miſtakes. In the preſent ſtudy of nature, our ſteps are more ſlow, and heſitating and painful; our concluſions are more limited and modeſt, but our diſcoveries are more certain and progreſſive, and the reſults are more applicable to the purpoſes of life. This pre-eminence of modern philoſophy over the ancient is ſeen in every path of inquiry. It was firſt remarkable in the ſtudy of the material world; and there it ſtill continues to be moſt conſpicuous. But it is no leſs to be ſeen in the later performances of philoſophers in metaphyſics, pneumatology, and ethics, where the mode of inveſtigation by analyſis and experiment has been greatly adopted; and we may add, that it is this juſter view of the employment which has reſtored philoſophers to the world, to ſociety. They are no longer to be found only in the academies of the ſophiſts and the cloiſters of a convent, but in the diſcharge of public and private duty. A philoſophic genius is a genius for obſervation as well as reflection, and he ſays, *Homo ſum, humani à me nihil alienum puto*.

78 Eſtimate of the philoſophic character. After ſaying ſo much on the nature of the employment, and the mode of procedure, it requires no deep penetration to perceive the value of the philoſophical character. If there is a propenſity in the human mind which diſtinguiſhes us from the inferior orders of ſentient beings, without the leaſt circumſtance of interference, a propenſity which alone may be taken for the characteriſtic of the ſpecies, and of which no trace is to be found in any other, it is diſintereſted intellectual curioſity, a love of diſcovery for its own ſake, independent of all its advantages.

We think highly (and with great juſtice do we think ſo) of our rational powers; but we may carry this too far, as we do every ground of ſelf-eſtimation. To every man who enjoys the chearing thought of living under the care of a wiſe Creator, this boaſted prerogative will be viewed with more modeſty and diffidence; and He has given us evident marks of the rank in which He eſteems the rational powers of man. In no caſe that is of eſſential importance, of indiſpenſable neceſſity, not only

View of Bacon's Philoſophy.

ly to our wellbeing but to our very exiſtence, has He left man to the care of his reaſon alone; for in the firſt inſtance, He has given us reaſon

> To guide the helm, while paſſion blows the gale.

79 We ſhould think modeſtly of our rational powers.

God has not truſted either the preſervation of the individual or the continuance of the race to man's notions of the importance of the taſk, but has committed them to the ſurer guards of hunger and of ſexual deſire. In like manner, He has not left the improvement of his nobleſt work, the intellectual powers of the ſoul of man, to his own notions how important it is to his comfort that he be thoroughly acquainted with the objects around him. No: He has committed this alſo to the ſure hand of curioſity: and He has made this ſo ſtrong in a few ſuperior ſouls, whom He has appointed to give light and knowledge to the whole ſpecies, as to abſtract them from all other purſuits, and to engage them in intellectual reſearch with an ardour which no attainment can ever quench, but, on the contrary, inflames it the more by every draught of knowledge.

80 Importance of our inſtinctive principles

> ———————— But what need words
> To paint its power? For this the daring youth
> Breaks from his weeping mother's fondling arms
> In foreign climes to rove. The penſive ſage,
> Heedleſs of ſleep, or midnight's hurtful vapour,
> Hangs o'er the ſickly taper.—Hence the ſcorn
> Of all familiar proſpects, though beheld
> With tranſport once. Hence th' attentive gaze
> Of young aſtoniſhment.
> Such is the bounteous providence of Heaven,
> In every breaſt implanting the deſire
> Of objects new and ſtrange, to urge us on
> With unremitting labour to attain
> The ſacred ſtores that wait the rip'ning ſoul
> In Truth's exhauſtleſs boſom. *Aikenſide.*

But human life is not a ſituation of continual neceſſity; this would ill ſuit the plans of its beneficent Author: and it is from induction of phenomena totally oppoſite to this, and from ſuch induction alone, that we have ever thought of a wiſe Creator. His wiſdom appears only in His beneficence. Human life is a ſcene filled with enjoyment; and the ſoul of man is ſtored with propenſities and powers which have *pleaſure, in direct terms*, for their object. Another ſtriking diſtinction of our nature is a continual diſpoſition to refinement, of which few traces are to be found in the actions of other animals. There is hardly a gift of nature ſo grateful in itſelf as to pleaſe the fleſhith mind of man till he has moulded it to his fancy. Not contented with food, with raiment, and with ſhelter, he muſt have nice cookery, ornamental dreſs, and elegant houſes. He hunts when he is not hungry, and he refines ſexual appetite into a moſt elegant paſſion. In like manner he has improved this anxious deſire of the knowledge of the objects around him, ſo as to derive from them the means of ſubſiſtence and comfort, into the moſt elegant and pleaſing of all gratifications, the accumulation of intellectual knowledge, independent of all conſideration of its advantages. And as every man has a title to the enjoyment of ſuch pleaſures as he can attain without injuring his neighbour; ſo it is allowable to ſuch as have got the means of intellectual improvement, without relinquiſhing the indiſpenſible ſocial duties, to puſh this advantage as far as it will go: and, in all ages and countries, it has been conſidered as forming the greateſt diſtinction between men of eaſy fortune and the poor, who muſt earn their ſubſiſtence by the ſweat of their brows. The peaſant muſt learn to work, the gentleman muſt learn to think; and nothing can be a ſurer mark of a groveling ſoul than for a man of fortune to have an uncultivated mind.

81 Our diſpoſition to refinement.

82 Ought to [illegible]

Let us then cheriſh to the utmoſt this diſtinguiſhing propenſity of the human ſoul. But let us do even this like philoſophers. Let us cultivate it as it is, as the handmaid to the arts and duties of life; as the guide leading to ſomething yet more excellent. A character is not to be eſtimated from what the perſon knows, but from what he can perform. The accumulation of intellectual knowledge is too apt to create an inordinate appetite for it: and the man habituated to ſpeculation is, like the miſer, too apt to place that pleaſure in the mere *poſſeſſion*, which he ought to look for only or chiefly in the *judicious uſe* of his favourite object. Like the miſer, too, his habits of hoarding up generally unfit him for the very enjoyment which at ſetting out he propoſed to himſelf. Seldom do we find the man, who has devoted his life to ſcientific purſuits for their own ſake, poſſeſſed of that ſuperiority of mind which the active employ to good purpoſe in times of perplexity; and much ſeldomer do we find him poſſeſſed of that promptitude of apprehenſion, and that deciſion of purpoſe, which are neceſſary for paſſing through the difficult ſcenes of human life.

But we may uſe the good things of this life without abuſing them; and by moderation here, as in all other purſuits, derive thoſe ſolid advantages which philoſophy is able to beſtow. And theſe advantages are great. To enumerate and deſcribe them would be to write a great volume. We may juſt take notice of one, which is an obvious conſequence of that ſtrict and ſimple view which we have given of the ſubject; and that is a modeſt opinion of our attainments. Appearances are all that we know; cauſes are for ever hid from our view; the powers of our nature do not lead us ſo far. Let us therefore, without heſitation, relinquiſh all purſuits which have ſuch things as ultimate principles for *objects of examination*. Let us [illegible] operations of things which it is our great buſineſs to [illegible]. Among theſe there is ſuch a ſubordination as that of means to ends, and of inſtruments to an operation. All will acknowledge the abſurdity of the project of viewing light with a microſcope. It is equally abſurd for us to examine the nature of knowledge, of truth, of infinite wiſdom, by our intellectual powers. We have a wide field of acceſſible knowledge in the works of God; and one of the greateſt advantages, and of the moſt delicious pleaſures, which we can derive from the contemplation, is the view which a judicious philoſophical reſearch will moſt infallibly give us of a world, not conſiſting of a number of detached objects, [illegible] but [illegible] all connected together by [illegible] degrees of ſubordination and [illegible] and all co-operating in the production of one great and glorious purpoſe. The heart which [illegible]

83 [illegible] knowledge.

that who contrived, created, and directs the whole. Let us not, therefore, to the timid admonitions of theological ignorance, which thinks with ſuperſtitious horror from the thoughts of accounting for every thing by the powers of matter, and conſiders theſe attempts as an approach to atheiſm. Philoſophical diſquiſitions will, on the contrary, exhibit theſe general laws of the univerſe, that wonderful concatenation and adjuſtment of every thing both material and intellectual, as the moſt ſtriking inſtance of incomprehenſible wiſdom; which, by means ſo few and ſo ſimple, can produce effects which by their grandeur dazzle our imagination, and by their multiplicity elude all poſſibility of enumeration. Of all the obſtacles which the weakneſs, the folly, or the ſinful vanity of men, has thrown in the way of the theologian, there is none ſo fatal, ſo hoſtile to all his endeavours, as a cold and comfortleſs ſyſtem of materialiſm, which the reaſoning pride of man firſt engendered, which made a figure among a few ſpeculatiſts in the laſt century, but was ſoon forgotten by the philoſophers really buſy with the obſervation of nature and of nature's God. It has of late reared up its head, being now cheriſhed by all who wiſh to get rid of the ſtings of remorſe, as the only opinion compatible with the peace of the licentious and the ſenſual: for we may ſay to them as Henry IV. ſaid to the prince of Wales, "Thy wiſh was father, Harry, to that thought." In vain will the divine attempt to lay this devil with the metaphyſical exorciſms of the ſchools; it is philoſophy alone that can detect the cheat. Philoſophy ſingles out the characteriſtic phenomena which diſtinguiſh every ſubſtance; and philoſophy never will heſitate in ſaying that there is a ſet of phenomena which characteriſe mind and another which characteriſe body, and that theſe are *toto cœlo* different. Continually appealing to fact, to the phenomena, for our knowledge of every cauſe, we ſhall have no difficulty in deciding that thought, memory, volition, joy, hope, are not compatible attributes with bulk, weight, elaſticity, fluidity. *Tuta ſub ægide Pallas;* philoſophy will maintain the dignity of human nature, will detect the ſophiſms of the materialiſts, confute their arguments; and ſhe alone will reſtore to the countenance of nature that ineffable beauty, of which thoſe would deprive her, who would take away the ſupreme Mind which ſhines from within, and gives life and expreſſion to every feature.

84 Philoſophical diſquiſitions give juſt notions of God and of our own ſouls.

Natural PHILOSOPHY. See NATURAL *Philoſophy*, PHILOSOPHY, and PHYSICS.

Experimental PHILOSOPHY. See EXPERIMENTAL *Philoſophy*.

Moral PHILOSOPHY. See MORAL *Philoſophy*.

PHILOSTORGIUS, an eccleſiaſtical hiſtorian of the 4th century, was born in Cappadocia, and wrote an abridgment of eccleſiaſtical hiſtory, in which he treats Athanaſius with ſome ſeverity. This work contains many curious and intereſting particulars. The beſt edition is that of Henry de Valois in Greek and Latin. There is alſo attributed to him a book againſt Porphyry.

PHILOSTRATUS, FLAVIUS, was an ancient Greek author. He wrote the Life of Apollonius Tyanenſis, and ſome other things which have come down to our time. Euſebius againſt Hierocles calls him an Athenian, becauſe he taught at Athens; but Eunapius and Suidas always ſpeak of him as a Lemnian: and he hints, in his Life of Apollonius, that he uſed to be at Lemnos when he was young. He frequented the ſchools of the ſophiſts; and he mentions his having heard Damianus of Epheſus, Proclus Naucratitas, and Hippodromus of Lariſſa. This ſeems to prove that he lived in the reign of the emperor Severus, from 193 to 212, when thoſe ſophiſts flouriſhed. He became known afterwards to Severus's wife Julia Auguſta, and was one of thoſe learned men whom this philoſophic empreſs had continually about her. It was by her command that he wrote the Life of Apollonius Tyanenſis, as he relates himſelf in the ſame place where he informs us of his connections with that learned lady. Suidas and Heſychius ſay that he was a teacher of rhetoric, firſt at Athens and then at Rome, from the reign of Severus to that of Philippus, who obtained the empire in 244.

Philoſtratus's celebrated work is his Life of Apollonius; which has erroneouſly been attributed to Lucian, becauſe it has been printed with ſome of that author's pieces. Philoſtratus endeavours, as Cyril obſerves, to repreſent Apollonius as a wonderful and extraordinary perſon; rather to be admired and adored as a god than to be conſidered as a mere man. Hence Eunapius, in the preface to his Lives of the Sophiſts, ſays that the proper title of that work would have been, *The Coming of a God to Men;* and Hierocles, in his book againſt the Chriſtians which was called *Philalethes*, and which was refuted by Euſebius in a work ſtill extant, among other things drew a compariſon between Apollonius and Jeſus Chriſt. It has always been ſuppoſed that Philoſtratus compoſed his work with a view to diſcredit the miracles and doctrines of our Lord, by ſetting up other miracles and other doctrines againſt them, and this ſuppoſition may be true; but that Apollonius was really an impoſtor and magician may not be ſo certain. He may, for what we know, have been a wiſe and excellent perſon; and it is remarkable, that Euſebius, though he had the worſt opinion of Philoſtratus's hiſtory, ſays nothing ill of Apollonius. He concluded that that hiſtory was written to oppoſe the hiſtory of Jeſus; and the uſe which the ancient infidels made of it juſtifies his opinion; but he draws no information from it with regard to Apollonius. It would have been improper to have done ſo; ſince the ſophiſtical and affected ſtyle of Philoſtratus, the ſources from whence he owns his materials to have been drawn, and, above all, the abſurdities and contradictions with which he abounds, plainly ſhow his hiſtory to be nothing but a collection of fables, either invented or at leaſt embelliſhed by himſelf.

The works of Philoſtratus, however, have engaged the attention of critics of the firſt claſs. Grævius had intended to have given a correct edition of them, as appears

Philoſtratus, Philotis.

appears from the preface of Meric Cafaubon to a diſſertation upon an intended edition of Homer, printed at London in 1658, 8vo. So had Bentley, who deſigned to add a new Latin verſion of his notes; and Fabricius ſays that he ſaw the firſt ſheet of Bentley's edition printed at Leipſic in 1691. Both theſe deſigns were dropped. A very correct and beautiful edition was publiſhed at length at Leipſic, 1709, in folio, by Olearius, profeſſor of the Greek and Latin tongues in that univerſity; who has proved himſelf perfectly qualified for the work he undertook, and ſhown all the judgement, learning, and induſtry, that are required in an excellent editor.

See Apollonius, and Blount (Charles).

At the end of Apollonius's Life there are 95 letters which go under his name. They are not, however, believed to be his, the ſtyle of them being very affected, and like that of a ſophiſt, while they bear in other reſpects all the marks of a forgery. Philoſtratus ſays that he ſaw a collection of Apollonius's Letters in Hadrian's library at Antium, but had not inſerted them all among theſe. They are ſhort, and have in them little elſe than moral ſentences. The Lives of the Sophiſts contain many things which are to be met with nowhere elſe. The Heroics of Philoſtratus are only a dialogue between a vintner of Thracian Cherſoneſus and a Phœnician, in which the former draws characters of Homer's heroes, and repreſents ſeveral things differently from that poet; and this upon the faith of Proteſilaus's ghoſt, who had lately viſited his farm, which was not far from the tomb of this hero. Olearius conjectures, with much probability, that Philoſtratus's deſign in this dialogue was ſecretly to criticiſe ſome things in Homer, which he durſt not do openly on account of the great veneration then paid to him, and for fear of the odium which Zoilus and others had incurred by cenſuring him too freely. The images are elegant deſcriptions and illuſtrations of ſome ancient paintings and other particulars relating to the fine arts; to which Olearius has ſubjoined the deſcription of ſome ſtatues by Calliſtratus; for the ſame reaſon that he ſubjoined Euſebius's book againſt Hierocles to the Life and Letters of Apollonius, namely, becauſe the ſubjects of theſe reſpective works are related to each other. The laſt piece is a collection of Philoſtratus's Letters; but ſome of theſe, though it is not eaſy to determine which, were written by a nephew to our Philoſtratus, of the ſame name, as were alſo the laſt eighteen in the book of images. This is the reaſon why the title runs not *Philoſtrati*, but *Philoſtratorum quæ ſuperſunt omnia.*

There were many perſons of the name of Philoſtratus among the ancients; and there were many other works of the Philoſtratus here recorded, but no others are extant beſides thoſe we have mentioned.

PHILOTIS, a ſervant maid at Rome, ſaved her countrymen from deſtruction. After the ſiege of Rome by the Gauls, the Fidenates aſſembled an army, and marched againſt the capital, demanding all the wives and daughters in the city as the only conditions of peace. This demand aſtoniſhed the ſenators; and when they refuſed to comply, Philotis adviſed them to ſend all the female ſlaves diſguiſed in matrons clothes, and ſhe offered to march herſelf at the head. Her advice was followed; and when the Fidenates had feaſted late in the evening, and were quite intoxicated and fallen aſleep, Philotis lighted a torch as a ſignal for her countrymen to attack the enemy. The attack was ſucceſsful; the Fidenates were conquered; and the ſenate, to reward the fidelity of the female ſlaves, permitted them to appear in the dreſs of the Roman matrons.

Philotis, Philyra.

PHILOXENUS, an officer of Alexander, who received Cilicia at the general diviſion of the provinces. ——A ſon of Ptolemy, who was given to Pelopidas as an hoſtage.——A dithyrambic poet of Cythera. He enjoyed the favour of Dionyſius tyrant of Sicily for ſome time, till he offended him by ſeducing one of his female ſingers. During his confinement Philoxenus compoſed an allegorical poem, called Cyclops; in which he had delineated the character of the tyrant under the name of Polyphemus, and repreſented his miſtreſs under the name of Galatæa, and himſelf under that of Ulyſſes. The tyrant, who was fond of writing poetry, and of being applauded, removed Philoxenus from his dungeon; but the poet refuſed to purchaſe his liberty by ſaying things unworthy of himſelf, and applauding the wretched verſes of Dionyſius, and therefore he was ſent to the quarries. Being ſet at liberty, he ſome time after was aſked his opinion at a feaſt about ſome verſes which Dionyſius had juſt repeated, and which the courtiers had received with the greateſt applauſe. Philoxenus gave no anſwer, but he ordered the guards that ſurrounded the tyrant's table to take him back to the quarries. Dionyſius was pleaſed with his pleaſantry and with his firmneſs, and immediately forgave him. Philoxenus died at Epheſus about 380 years before Chriſt.

PHILTER, or Philtre, (*Philtrum*), in *Pharmacy*, &c. a ſtrainer.

Philter, is alſo uſed for a drug or preparation, which it is pretended will excite love.—The word is formed from the Greek φιλεω, "I love," or φιλος, "lover."

Philters are diſtinguiſhed into *true* and *ſpurious*, and were given by the Greeks and Romans to excite love. The ſpurious are ſpells or charms, ſuppoſed to have an effect beyond the ordinary laws of nature by ſome magic virtue; ſuch are thoſe ſaid to be given by old women, witches, &c.—The true philters are thoſe ſuppoſed to work their effect by ſome natural and magnetical power. There are many grave authors who believe the reality of theſe philters, and allege matter of fact in confirmation of their ſentiments: among the reſt, Van Helmont, who ſays, that upon holding a certain herb in his hand for ſome time, and taking afterwards a little dog by the foot with the ſame hand, the dog followed him wherever he went, and quite deſerted his former maſter; which he pretends to account for thus: The heat communicated to the herb, not coming alone, but animated by the emanations of the natural ſpirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the ſpirit of the other object magnetically, and gives it an amorous motion.—But this is mere cant; and all philters, whatever facts may be alleged, are mere chimeras.

PHILYCA. See Phillyrea, Botany Index.

PHILYRA, in fabulous hiſtory, was one of the Oceanides, whom Saturn met in Thrace. The god, to eſcape from the vigilance of Rhea, changed himſelf into a horſe, to enjoy the company of Philyra, by whom he had a ſon half a man and half a horſe, called Chiron.

Philyra was ſo aſhamed of giving birth to ſuch a monſter, that ſhe entreated the gods to change her nature. She was accordingly metamorphoſed into a tree, called by her name among the Greeks.

PHIMOSIS, in *Medicine*, a diſorder of the penis, in which the prepuce is ſo ſtrict or tenſe, that it cannot be drawn back over the glans. See SURGERY.

PHINEHAS, or, as the Jews pronounce it PINEHAS, was the ſon of Eleazar, and grandſon of Aaron. He was the third high prieſt of the Jews, and diſcharged this office from the year of the world 2571, till towards the year 2590. He is particularly commended in Scripture for the zeal he ſhowed in vindicating the glory of God, when the Midianites had ſent their daughters into the camp of Iſrael, to tempt the Hebrews to fornication and idolatry. For Zimri having publicly entered into the tent of a Midianitiſh woman named *Cozbi*, Phinehas aroſe up from among the people (Numb. xxv. 7, &c.), took a javelin in his hand, entered after Zimri into that infamous place, and ſtabbed both man and woman at one blow, in thoſe parts that were chiefly concerned in this criminal commerce. Upon which the plague or diſtemper ceaſed with which the Lord had already begun to puniſh the Iſraelites. This happened in the year of the world 2553.

Then the Lord ſaid to Moſes, Phinehas the ſon of Eleazar the high-prieſt has turned away my wrath from the children of Iſrael, becauſe he has been zealous in my cauſe, and has hindered me from deſtroying them: wherefore acquaint him, that I give him my covenant of peace, and the prieſthood ſhall be given to his poſterity by a perpetual covenant, becauſe he has been zealous for his God, and has made atonement for the crime of the children of Iſrael. This promiſe that the Lord made to Phinehas, to give him the prieſthood by a perpetual covenant, interpreters obſerve, evidently included this tacit condition, that his children ſhould continue faithful and obedient; ſince we know that the prieſthood paſſed out of the family of Eleazar and Phinehas to that of Ithamar, and that it returned not to the poſterity of Eleazar till after about 150 years.

This is what we find concerning the tranſlation of the high-prieſthood from one family to the other. This dignity continued in the race of Phinehas, from Aaron down to the high-prieſt Eli, for about 335 years. See AARON.

The manner and cauſes of this change are unknown. It re-entered again into the family of Eleazar, under the reign of Saul, when this prince having put to death Abimelech, and the other prieſts of Nob, he gave the high-prieſthood to Zadok, who was of the race of Phinehas. At the ſame time, David had Abiathar with him, of the race of Eli, who performed the functions of high-prieſt. So that after the death of Saul, David continued the prieſthood to Zadok and Abiathar conjointly. But towards the end of David's reign, Abiathar having eſpouſed the intereſt of Adonijah, to the prejudice of Solomon, he was in diſgrace, and Zadok only was acknowledged as high-prieſt. The prieſthood continued in his family till after the captivity of Babylon, and even to the deſtruction of the temple. But from the beginning of Zadok's prieſthood alone, and the excluſion of Abiathar, to the ruin of the temple, is 1084 years.

We read of another memorable action of Phinehas, in which he ſtill ſhowed his zeal for the Lord. This was when the Iſraelites that were beyond Jordan had raiſed upon the banks of this river a vaſt heap of earth (Joſh. xxii. 30, 31.). Thoſe on the other ſide fearing they were going to forſake the Lord, and ſet up another religion, deputed Phinehas and other chief men among them, to go and inform themſelves of the reaſon of erecting this monument. But when they had found that it was in commemoration of their union and common original, Phinehas took occaſion from thence to praiſe the Lord, ſaying, "We know that the Lord is with us, ſince you are not guilty of that prevarication we ſuſpected you were."

We do not exactly know the time of the death of Phinehas. But as he lived after the death of Joſhua, and before the firſt ſervitude under Chuſhan-riſhathaim, during the time that there were neither kings nor judges in the land, and every one did what was right in his own eyes (Judges xvii. 6. xviii. 1. xxi. 24.); his death is put about the year of the world 2590. It was under his pontificate that the ſtory of Micah happened, as alſo that of the tribe of Dan, when they made a conqueſt of Laiſh; and the enormity that was committed upon the wife of the Levite of the mountain of Ephraim (Judges xx. 28.). Phinehas's ſucceſſor in the high-prieſthood was Abiezer, or Abiſhuah.

The Rabbins allow a very long life to Phinehas. There are ſome who believe he lived to the time of the high-prieſt Eli, or even to the time of Samſon. Others will have it, that he was the ſame as Eli, or rather as the prophet Elias, which would ſtill prolong his life for ſeveral ages.

PHINEUS, in fabulous hiſtory, was a ſon of Agenor, king of Phœnicia, or according to ſome of Neptune. He became king of Thrace, or, according to the greater part of mythologiſts, of Bithynia. He married Cleopatra the daughter of Boreas, called by ſome *Cleobula*, by whom he had Plexippus and Pandion. After her death, he married Idæa the daughter of Dardanus. Idæa, jealous of his former wife's children, accuſed them of attempts upon their father's life and crown, or, as others aſſert, of attempts upon her virtue; on which they were condemned by Phineus to be deprived of their eyes. This cruelty was ſoon after puniſhed by the gods; for Phineus ſuddenly became blind, and the Harpies were ſent by Jupiter to keep him in continual alarm, and to ſpoil the meats which were placed on his table. He was afterwards delivered from theſe dangerous monſters by his brothers-in-law Zetes and Calais, who purſued them as far as the Strophades. He likewiſe recovered his ſight by means of the Argonauts, whom he had received with great hoſpitality, and whom he inſtructed in the eaſieſt and ſpeedieſt way of arriving in Colchis. The cauſes of the blindneſs of Phineus are a matter of diſpute among the ancients; ſome ſuppoſing that this was inflicted by Boreas for his cruelty to his grandſon; while others attribute it to the anger of Neptune, becauſe he had directed the ſons of Phryxus how to eſcape from Colchis to Greece. Many, however, imagine that it proceeded from his having raſhly attempted to develope futurity; while others aſſert that Zetes and Calais put out his eyes on account of his cruelty to their nephews. The ſecond wife of Phineus is called by ſome *Dia*, *Eurytie*, *Danae*, and *Idothea*.—He was killed by Hercules.

Phlebotomy, Phlegon

PHLEBOTOMY, the opening of a vein with a proper ſharp-edged and pointed inſtrument, in order to let out a certain quantity of blood either for the preſervation or recovery of a perſon's health. See SURGERY.

PHLEGM, in the animal economy, one of the four humours whereof the ancients ſuppoſed the blood to be compoſed. The chemiſts make phlegm or water an elementary body; the characters of which are fluidity, inſipidity, and volatility.

PHLEGMAGOGUES, in *Medicine*, a term anciently made uſe of for ſuch medicines as were ſuppoſed to be endowed with the property of purging off phlegm; ſuch as hermodactyls, agaric, turbith, jalap, &c.

PHLEGMATIC, among phyſicians, an appellation given to that habit or temperament of body wherein phlegm is predominant; which gives riſe to catarrhs, coughs, &c.

PHLEGMON, denotes an external inflammation and tumor, attended with a burning heat.

PHLEGON, who was ſurnamed *Trallianus*, was born in Trallis a city of Lydia. He was the emperor Hadrian's freed man, and lived to the 18th year of Antoninus Pius; as is evident from his mentioning the conſuls of that year. He wrote ſeveral works of great erudition, of which we have nothing left but fragments. Among theſe was a Hiſtory of the Olympiads, A Treatiſe of Long-lived Perſons, and another of Wonderful Things; the ſhort and broken remains of which Xylander tranſlated into Latin, and publiſhed at Baſil in 1568, with the Greek and with notes. Meurſius publiſhed a new edition of them with his notes at Leyden, in 1622. The titles of part of the reſt of Phlegon's writings are preſerved by Suidas. It is ſuppoſed that the Hiſtory of Hadrian, publiſhed under Phlegon's name, was written by Hadrian himſelf, from this paſſage of Spartianus: "Hadrian thirſted ſo much after fame (ſays he), that he gave the books of his own life, drawn up by himſelf, to his freedmen, commanding them to publiſh thoſe books under their own names; for we are told that Hadrian wrote Phlegon's books."

Phlegon's name has been more familiar among the moderns, and his fragments have had a greater degree of regard paid to them than perhaps they deſerve, merely becauſe he has been ſuppoſed to ſpeak of the darkneſs which prevailed during our Lord's paſſion. The book in which the words are contained is loſt; but Euſebius has preſerved them in his *Chronicon*. They are theſe: "In the 4th year of the 202d Olympiad, there was a greater and more remarkable eclipſe of the ſun than any that had ever happened before: for at the ſixth hour the day was ſo turned into the darkneſs of night, that the very ſtars in the firmament were viſible; and there was an earthquake in Bithynia which threw down many houſes in the city of Nicea." Euſebius thinks that theſe words of Phlegon relate to the prodigies which accompanied Chriſt's crucifixion; and many other fathers of the church have thought the ſame: but this opinion is liable to many difficulties; for no man had ever a ſtronger deſire than Phlegon to compile marvellous events, and to obſerve the [illegible] circumſtances in them. How was it then poſſible that a man of this turn of mind ſhould not have taken notice of the moſt ſurpriſing circumſtance in the eclipſe which it is imagined he hints at, viz. its happening on the day when the moon was at the full? But had Phlegon done this, Euſebius would not have omitted it; and Origen would not have ſaid that Phlegon had omitted this particular.

Phlegon, Phlogiſton.

It was a matter of controverſy ſome time ago, whether Phlegon really ſpoke of the darkneſs at the time of our Lord's paſſion; and many diſſertations were written on both ſides of the queſtion. This diſpute was occaſioned by the above paſſage from Phlegon being left out in an edition of Clarke's Boyle's Lectures, publiſhed after his death, at the inſtance of Sykes, who had ſuggeſted to Clarke, that an undue ſtreſs had been laid upon it. Whiſton, who informs us of this affair, expreſſes great diſpleaſure againſt Sykes, and calls "the ſuggeſtion groundleſs." Upon this, Sykes publiſhed "A Diſſertation on the Eclipſe mentioned by Phlegon: or, "An Inquiry whether that Eclipſe had any relation to the darkneſs which happened at our Saviour's Paſſion; 1732," 8vo. Sykes concludes it to be moſt probable that Phlegon had in view a natural eclipſe which happened November 24, in the firſt year of the 202d Olympiad, and not in the 4th year of the Olympiad in which Chriſt was crucified. Many pieces were written againſt him, and to ſome of them he replied; but perhaps it is a controverſy which concerns the learned world merely, ſince the cauſe of religion is but little affected by it.

Photius blames Phlegon for expatiating too much on trifles, and for collecting too great a number of anſwers pronounced by the oracles. "His ſtyle (he tells us) is not altogether flat and mean, nor does it everywhere imitate the attic manner of writing. But otherwiſe, the over nice accuracy and care with which he computes the Olympiads, and relates the names of the conteſts, the tranſactions, and even oracles, is not only very tireſome to the reader, whereby a cloud is thrown over all other particulars in that book, but the diction is thereby rendered unpleaſant and ungrateful; and indeed he is every moment bringing in the anſwers pronounced by all kinds of deities."

PHLOGISTON, a term uſed by chemiſts to denote a principle which was ſuppoſed to enter into the compoſition of various bodies.

The bodies which were thought to contain it in the largeſt quantity are ſuch as are inflammable; and the property which theſe ſubſtances poſſeſs of being ſuſceptible of inflammation was thought to depend on this principle; and hence it was ſometimes called the *Principium of Inflammation*. Inflammation, according to this doctrine, was the ſeparation of the principle or *phlogiſton* from the other matter which compoſed the combuſtible body. As this ſeparation was always attended with the emiſſion of light and heat, ſome chemiſts concluded that it was light and heat combined with other matter in a peculiar manner, ſo that it was [illegible] highly [illegible] and very [illegible], or certain modifications of which heat and light [illegible].

Another claſs of bodies which were ſuppoſed to contain phlogiſton are the metals; and the chemiſts ſuppoſed that the peculiar luſtre of the metals depended on this principle. All this they thought themſelves confirmed in by the evidence of their ſenſes in [illegible]

Phlogiſton.

becauſe by expoſing a metal to the action of a long continued heat, it loſt its metallic luſtre, and was converted into an earthy-like ſubſtance called *calx metallicus* or *oxide;* and ſecondly, becauſe by mixing this oxide with any inflammable ſubſtance whatever, and ſubjecting the mixture to certain operations, the inflammable matter diſappeared, and the metal was reſtored to its former ſtate and luſtre, without ſuffering much diminution in quantity, eſpecially if the proceſſes had been conducted with care and attention.

This fact relative to the metals was thought to be a full demonſtration of itſelf, independent of other proofs which were brought to ſupport the doctrine. Theſe were, that a combuſtible body, by the act of inflammation (i. e. by the diſſipation of its phlogiſton in the form of heat and light), was converted into a body that was no longer combuſtible, but which might have its property of combuſtibility reſtored to it again by mixing the incombuſtible remains with any kind of inflammable matter, and ſubmitting the mixture to certain proceſſes. In this way the body was reſtored to its former ſtate of inflammability.

They were alſo at ſome pains to prove that the *phlogiſton* or the *principle of inflammability* was the ſame in all inflammable bodies and in the metals. This identity of phlogiſton they thought to be evident from the fact, that the calx of a metal might be reſtored to its metallic ſtate, or that the remains after the combuſtion of a combuſtible body might be reſtored to its original ſtate of combuſtibility by the addition of any inflammable body whatever, taken either from the animal, vegetable, or mineral kingdoms.

Theſe and ſeveral other facts were brought to prove, not only the exiſtence of phlogiſton, but its effects in mixture with other ſubſtances; and the objections which were made againſt the doctrine were removed with wonderful ingenuity. The chief objection againſt it was, that if the inflammation of a combuſtible body, or the converſion of a metal into calx, depends on the diſſipation or extrication of phlogiſton; then it muſt follow, that the remains of a combuſtible body after inflammation, and the calx of the metal, muſt be leſs than the matter from which they were produced: but this is contrary to fact; for when we collect with care all the vapour into which the pureſt inflammable bodies are converted by combuſtion, theſe incombuſtible remains are much heavier than the inflammable body was from which they were produced, and the calx into which a metal is converted by long expoſure to the action of heat is heavier than the metal from which it was produced. This conſideration made ſeveral people doubt of the truth of the doctrine; but the objection was removed by ſaying, that phlogiſton was ſo ſubtile, as not only to have no weight, but to poſſeſs an abſolute levity; and that when it was taken from an abſolutely heavy body, that body muſt, by loſing ſo much abſolute levity, become heavier, in the ſame manner as the algebraiſts ſay, that a poſitive quantity is augmented by the ſubtraction of a negative quantity. This ſophiſm ſatisfied the minds of moſt of the chemiſts, eſpecially thoſe who were algebraiſts.

The opinion that phlogiſton was heat and light ſomehow combined with other matter, was proved, not only by the fact, that heat and light were emitted from a combuſtible body during its combuſtion, but from the reduction of certain metallic calces to the original metallic ſtate again, at leaſt in ſome degree, by ſimple expoſure to heat and light. The white calx of ſilver for inſtance, when expoſed in cloſe ſealed glaſs veſſels to the light and heat of the ſun, reſumes a black tinge, and is in part reſtored to its metallic luſtre without any addition whatever; but then this reſtoration, like the others above-mentioned, is attended with a loſs of weight.

Beſides conſtituting the principal part of inflammable bodies and metals, phlogiſton was thought to be the cauſe of colour in all vegetable and animal ſubſtances. This was concluded from the fact of plants growing white when defended from the action of the ſun's rays, and in having their green colour reſtored by expoſure to his rays again; and ſo far did the chemiſts ſuffer themſelves to be deceived, that they actually thought the green colouring matter, which they extracted from freſh plants by certain chemical proceſſes, to be an inflammable ſubſtance. A very material objection was made to this argument, viz. if plants owe their colour to phlogiſton imparted by the ſun's rays, why do the ſun's rays deſtroy vegetable colours that are expoſed to them? for we know that the ſun's rays are very effectual in diminiſhing the luſtre of cloth dyed with vegetable colours, and in bleaching or taking out various ſtains from linen and other ſubſtances. All this was removed by ſaying, that the ſun's rays poſſeſſed different powers on living and on dead vegetable matter, and that the living vegetables had the power of abſorbing phlogiſton from the ſun's rays, which dead vegetable matter had not.

Since the exiſtence of phlogiſton, as a chemical principle in the compoſition of certain bodies, is now fully proved to be falſe, we ſhall not trouble our readers with any farther obſervations on it, except adding, that although the chemiſts were ſatisfied with the proofs they gave of its reality, they were never able to exhibit it in a ſeparate ſtate, or ſhow it in a pure form, unmixed with other matter.

Phlogiſton ſeems to have been admitted as a principle in the compoſition of certain bodies, and to have been ſuppoſed the cauſe of certain modifications of matter, merely with a view to explain ſome of thoſe natural phenomena which the authors of it were unable to explain on other principles. Subſequent diſcoveries in natural philoſophy and in chemiſtry have repreſented things in a very different light from that in which the old chemiſts viewed them. The old chemiſts knew nothing but chemiſtry; they ſeldom extended their views to the obſervation of objects beyond their laboratories, and it was not till philoſophers became chemiſts, and chemiſts philoſophers, that chemiſtry began to wear the garb of ſcience. The epoch in which this change began was in the time of Lord Verulam, who firſt removed the dimneſs from the chemiſt's eyes, and to him ſucceeded the honourable Mr Boyle. Sir Iſaac Newton, with the little aſſiſtance which his predeceſſors in this branch of ſcience afforded him, is in reality the firſt who eſtabliſhed chemiſtry on ſcientific ground. It muſt, however, be acknowledged, that although he made a great progreſs, he left much undone; and ſubſequent chemiſts, who were leſs accurate obſervers of nature, admitted principles unwarrantably. From the time of Sir Iſaac Newton till the middle of the 18th century, no real improvement was made in ſcientific chemiſtry; and the progreſs this ſcience has made ſince that period is owing to the important diſcovery of the exiſtence of heat in a ſtate of compoſition with other matter. Heat thus combined loſes its activity or becomes inſenſible, juſt in the ſame way as any other active ſubſtance loſes its apparent qualities in compoſition. Acids, for example, when combined in a certain proportion with ſubſtances for which they have ſtrong attraction, as alkalies or abſorbent earths, loſe all their obvious acid qualities, and the compound turns out mild, and totally conceals the acid which it contains. In a ſimilar manner, heat, when combined in certain proportions with other matter, loſes its ſenſible qualities, and the compound conceals the heat which it contains. Heat, in this combined ſtate, was called by its ingenious diſcoverer, Dr Black, *latent heat*, and it was found to be very abundant in the atmoſphere, which owes its exiſtence as an elaſtic fluid to the quantity of latent heat that it contains. After this diſcovery was made, Dr Crawford, conſidering that air was abſorbed by a burning body, concluded that the heat which appears in the combuſtion of a combuſtible body, is the heat that had before exiſted in the air which was conſumed by the burning body. M. Lavoiſier and others, proſecuting this inquiry, found that the combuſtible body, while it is burning, unites with the baſis of the air, and that the heat which the air contained, and which was the cauſe of the air exiſting in the ſtate of air, is expelled. This abſorption of the baſis of the air by the burning body, and the reduction of this baſis to a ſolid form, accounts for the increaſe of weight which a body acquires by burning; or, in other words, gives a reaſon why the matter into which a combuſtible body is converted by combuſtion, is heavier than the body from which it was produced. The ſame abſorption of air is obſervable, when a metal is converted into a calx, and the additional weight of the calx is found to be preciſely equal to the weight of the air abſorbed during the calcination. On theſe principles, therefore, we now explain the phenomena in a much more ſatisfactory manner than by the ſuppoſition of phlogiſton, or a principle of inflammability. See CHEMISTRY.

PHLOMIS, the SAGE-TREE, or *Jeruſalem Sage*; a genus of plants belonging to the didynamia claſs. See BOTANY *Index*.

PHLOX, LYCHNIDEA, or *Baſtard Lychnis*; a genus of plants belonging to the pentandria claſs. See BOTANY *Index*.

PHLYCTENÆ, in *Medicine*, ſmall eruptions on the ſkin.

PHOCA, a genus of quadrupeds of the order of feræ. See MAMMALIA *Index*.

PHOCÆA, the laſt town of Ionia, (Mela, Pliny); of Æolis, (Ptolemy), becauſe ſituated on the right or north ſide of the river Hermus, which he makes the boundary of Æolis to the ſouth. It ſtood far in the land, on a bay or arm of the ſea; had two very ſafe harbours, the one called *Lampter*, the other *Nauſtathmos*, (Livy). It was a colony of Ionians, ſituated in the territory of Æolis, (Herodotus). Maſſilia in Gaul was again a colony from it. *Phocæenſes*, the people, (Livy); *Phocaicus*, the epithet, (Lucan); applied to *Marſeilles*. It was one of the 12 cities which aſſembled in the panionium or general council of Ionia.

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Some writers tell us, that while the foundations of this city were laying, there appeared near the ſhore a great ſhoal of ſea calves; whence it was called *Phocæa*, the word *phoca* ſignifying in Greek a *ſea calf*. Ptolemy, who makes the river Hermus the boundary between Æolia and Ionia, places Phocæa in Æolis; but all other geographers reckon it among the cities of Ionia. It ſtood on the ſea-coaſt, between Cuma to the north, and Smyrna to the ſouth, not far from the Hermus; and was, in former times, one of the moſt wealthy and powerful cities of all Aſia; but is now a poor beggarly village, though the ſee of a biſhop. The Phocæans were expert mariners, and the firſt among the Greeks that undertook long voyages; which they performed in galleys of fifty oars. As they applied themſelves to trade and navigation, they became acquainted pretty early with the coaſts and iſlands of Europe, where they are ſaid to have founded ſeveral cities, namely, Velia in Italy; Alalia, or rather Aleria, in Corſica; and Marſeilles in Gaul. Neither were they unacquainted with Spain; for Herodotus tells us, that in the time of Cyrus the Great, the Phocæans arriving at Sarteſſus, a city in the bay of Cadiz, were treated with extraordinary kindneſs by Arganthonius king of that country; who, hearing that they were under no ſmall apprehenſion of the growing power of Cyrus, invited them to leave Ionia, and ſettle in what part of his kingdom they pleaſed. The Phocæans could not be prevailed upon to forſake their country; but accepted a large ſum of money, which that prince generouſly preſented them with, to defray the expence of building a ſtrong wall round their city. The wall they built on their return; but it was unable to reſiſt the mighty power of Cyrus, whoſe general Harpagus, inveſting the city with a numerous army, ſoon reduced it to the utmoſt extremities. The Phocæans, having no hopes of any ſuccour, offered to capitulate; but the conditions offered by Harpagus ſeeming ſevere, they begged he would allow them three days to deliberate; and in the mean time, withdraw his forces. Harpagus, though not ignorant of their deſign, complied with their requeſt. The Phocæans, taking advantage of this condeſcenſion, put their wives, children, and all their moſt valuable effects, on board ſeveral veſſels which they had ready equipped, and conveyed them ſafe to the iſland of Chios, leaving the Perſians in poſſeſſion of empty houſes. Their deſign was to purchaſe the Oeneſſian iſlands, which belonged to the Chians, and ſettle there. But the Chians not caring to have them ſo near, leſt they ſhould engroſs all the trade to themſelves, as they were a ſeafaring people, they put to ſea again; and, having taken Phocæa, their native country, by ſurpriſe, put all the Perſians they found in it to the ſword. They went to Corſica; great part of them however returned very ſoon, as did the reſt alſo in a few years. They then lived in ſubjection either to the Perſians, or tyrants of their own. Among the latter we find mention made of Laodamus, who attended Darius Hyſtaſpis in his expedition againſt the Scythians; and of Dionyſius, who, joining Ariſtagoras, tyrant of Miletus, and chief author of the Ionian rebellion, retired, after the defeat of his countrymen, to Phœnicia, where he made an immenſe booty, ſeizing on all the ſhips he met with trading to that country. From Phœnicia he ſailed to Sicily, where he committed great depredations on the Carthaginians and Tuſcans; but is ſaid never to have moleſted the Greeks.

In the Roman times the city of Phocæa ſided with

Antiochus the Great; whereupon it was beſieged, taken, and plundered, by the Roman general; but allowed to be governed by its own laws. In the war which Ariſtonicus brother to Attalus, king of Pergamus, raiſed againſt the Romans, they aſſiſted the former to the utmoſt of their power; a circumſtance which ſo diſpleaſed the ſenate, that they commanded the town to be demoliſhed, and the whole race of the Phocæans to be utterly rooted out. This ſevere ſentence would have been put in execution, had not the Maſſilienſes, a Phocæan colony, interpoſed, and, with much difficulty, aſſuaged the anger of the ſenate. Pompey declared Phocæa a free city, and reſtored the inhabitants to all the privileges they had ever enjoyed; whence, under the firſt emperors, it was reckoned one of the moſt flouriſhing cities of all Aſia Minor. This is all we have been able to collect from the ancients touching the particular hiſtory of Phocæa.

PHOCAS, a Roman centurion, was raiſed to the dignity of emperor by the army, and was crowned at Conſtantinople about the year 603. The emperor Mauritius, who was thus deſerted both by the army and the people, fled to Chalcedon with his five children, whom Phocas cauſed to be inhumanly murdered before his eyes, and then he murdered Mauritius himſelf, his brother, and ſeveral other perſons who were attached to that family.

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Phocas, thus proclaimed and acknowledged at Conſtantinople, ſent, according to cuſtom, his own image and that of his wife Leontia to Rome, where they were received with loud acclamations, the people there being incenſed againſt Mauritius on account of the cruel exactions of the exarchs, and his other miniſters in Italy. Gregory, ſurnamed the Great, then biſhop of Rome, cauſed the images to be lodged in the oratory of the martyr Cæſarius, and wrote letters to the new emperor, congratulating him upon his advancement to the throne, which he ſaid was effected by a particular providence, to deliver the people from the innumerable calamities and heavy oppreſſions under which they had long groaned. Had we no other character of Phocas and Leontia but that which has been conveyed to us in Gregory's letters, we ſhould rank him amongſt the beſt princes mentioned in hiſtory; but all other writers paint him in quite different colours; and his actions, tranſmitted to us by ſeveral hiſtorians, evidently ſpeak him a moſt cruel and blood-thirſty tyrant. He was of middling ſtature, ſays Cedrenus, deformed, and of a terrible aſpect: his hair was red, his eye-brows met, and one of his cheeks was marked with a ſcar, which, when he was in a paſſion, grew black and frightful: he was greatly addicted to wine and women, blood-thirſty, inexorable, bold in ſpeech, a ſtranger to compaſſion, in his principles a heretic. He endeavoured, in the beginning of his reign, to gain the affections of the people by celebrating the Circenſian games with extraordinary pomp, and diſtributing on that occaſion large ſums among the people; but finding that inſtead of applauding they reviled him as a drunkard, he ordered his guards to fall upon them. Some were killed, many wounded, and great numbers were dragged to priſon: but the populace riſing, ſet them at liberty, and thenceforth conceived an irreconcileable averſion to the tyrant.

As ſoon as the death of Mauritius was known, Narſes, who then commanded the troops quartered on the frontiers of Perſia, revolted. Phocas, however, managed matters ſo as to gain him over to his intereſt, and then treacherouſly and cruelly burnt him alive. He endeavoured to ſtrengthen his cauſe by reſpectable alliances; but his cruelty was ſuch as to render him generally hated, for he ſpared neither ſex nor age, and amongſt others he murdered Conſtantina the widow of Mauritius, and her daughters. Theſe cruelties were at length the cauſe of his downfall. He became univerſally hateful; and perſons in great authority near his perſon conſpired againſt him. This conſpiracy, however, was diſcovered, and the perſons concerned in it were all put to death. The following year, however, 610, he was overtaken by the fate he had ſo long deſerved.

Heraclius, the ſon of the governor of Africa, who bore the ſame name, taking upon him the title of emperor, and being acknowledged as ſuch by the people of Africa, ſailed from thence with a formidable fleet, and a powerful army on board, for Conſtantinople, while Nicetas marched thither by way of Alexandria and the Pentapolis. Heraclius ſteered his courſe to Abydus, where he was received with great demonſtrations of joy by ſeveral perſons of rank, who had been baniſhed by Phocas. From Abydus he ſailed to Conſtantinople, where he engaged and utterly defeated the tyrant's fleet. Phocas took refuge in the palace; but one Photinus, whoſe wife he had formerly debauched, purſuing him with a party of ſoldiers, forced the gates, dragged the cowardly emperor from the throne, and having ſtripped him of the imperial robes, and clothed him with a black veſt, carried him in chains to Heraclius, who commanded firſt his hands and feet, then his arms, and at laſt his head, to be cut off: the remaining part of his body was delivered up to the ſoldiers, who burnt it in the forum. We are told, that Heraclius having reproached him with his evil adminiſtration, he anſwered, with great calmneſs, "It is incumbent upon you to govern better." Such was the end of this cruel tyrant, after he had reigned ſeven years and ſome months.

PHOCILIDES, a Greek poet and philoſopher of Miletus, flouriſhed about 540 years before the Chriſtian era. The poetical piece now extant, attributed to him, is not of his compoſition, but of another poet who lived in the reign of Adrian.

PHOCION was a diſtinguiſhed Athenian general and orator in the time of Philip II. of Macedon. His character is thus deſcribed in the Ancient Univerſal Hiſtory. "He was too modeſt to ſolicit command, nor did he promote wars that he might raiſe his authority by them; though, taken either as a ſoldier, orator, ſtateſman, or general, he was by far the moſt eminent Athenian of his time. As he was a moſt diſintereſted patriot, he could entertain no great affection for Philip: but as he perfectly well knew the diſpoſition of his countrymen, and how unlikely they were long to ſupport ſuch meaſures as were neceſſary to humble the Macedonian power, he did not expreſs himſelf vehemently, but choſe rather to cultivate the eſteem which on all occaſions Philip ſhowed for the ſtate of Athens, as a mean of preſerving her, when ſhe ſhould be reduced to that ſituation which he conceived they wanted virtue to prevent. From this character the reader will eaſily diſcern that

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Phocion.

Demoſthenes and he could not well agree. The former was always warm, his language copious, and his deſigns extenſive; and Phocion, on the other hand, was of a mild temper, delivered his opinion in very few words, and propoſed ſchemes at once neceſſary and eaſy to be effected. Yet he ſeldom or never concurred with the people, but ſpoke as poignantly againſt their vices as Demoſthenes himſelf; inſomuch that this orator once told him, ‘ The Athenians, Phocion, in ſome of their mad fits, will murder thee.’ ‘ The ſame (anſwered he) may fall to thee, Demoſthenes, if ever they come to be ſober.”

He was afterwards appointed to command the army which was ſent to aſſiſt the Byzantines againſt Philip, whom he obliged to return to his own dominions. This truly great man, whom, though extremely poor, no ſum could bribe to betray his country, and who at every riſk on all occaſions gave them ſound advice, was at length accuſed by his ungrateful countrymen. This event happened in the year before Chriſt 318. He was ſent to Athens by Polyperchon head of a faction in Macedonia, together with his friends, chained in carts, with this meſſage, “ That though he was convinced they were traitors, yet he left them to be judged by the Athenians as a free people.” Phocion demanded whether they intended to proceed againſt him by form of law; and ſome crying out that they would, Phocion demanded how that could be if they were not allowed a fair hearing: but perceiving, by the clamour of the people, that no ſuch thing was to be expected, he exclaimed, “ As for myſelf, I confeſs the crime objected to me, and ſubmit to the judgement of the law; but conſider, O ye Athenians, what have theſe poor innocent men done that they ſhould be involved in the ſame calamity with me?” The people replied with great vociferation, “ They are your accomplices, and that is enough.” Then the decree was read, adjudging them all to death, viz. Phocion, Nicocles, Theudippus, Agamon, and Pythocles; theſe were preſent: Demetrius, Phalereus, Callimedon, Charicles, and others, were condemned in their abſence. Some moved that Phocion might be tortured before he was put to death; nay, they were for bringing the rack into the aſſembly, and torturing him there. The majority, however, thought it enough if he was put to death, for which the decree was carried unanimouſly; ſome putting on garlands of flowers when they gave their votes. As he was going to execution, a perſon who was his intimate friend aſked him if he had any meſſage for his ſon? “ Yes,” replied Phocion; “ tell him it is my laſt command that he forget how ill the Athenians treated his father.”

The ſpleen of his enemies was not extinguiſhed with his life: they paſſed a decree whereby his corpſe was baniſhed the Athenian territories; they likewiſe forbade any Athenians to furniſh fire for his funeral pile. One Conopian took up the corpſe, and carried it beyond Eleuſina, where he borrowed ſome fire of a Megarian woman and burned it. A Megarian matron, who attended with her maid, raiſed on the place an honorary monument; and having gathered up the bones, carried them home, and buried them under her own hearth; praying at the ſame time thus to the Penates: “ To you, O ye gods, guardians of this place, I commit the precious remains of the moſt excellent Phocion. Protect them, I beſeech you, from all inſults; and deliver them one day to be repoſited in the ſepulchre of his anceſtors, when the Athenians ſhall become wiſer.” It was not long before this opportunity occurred. When the Athenians began to cool a little, and remember the many ſervices they had received from Phocion, they decreed him a ſtatue of braſs; ordered his bones to be brought back at the public expence; and decreed that his accuſers ſhould be put to death. Agnonides, who was principally concerned in that tragedy, ſuffered; but Epicurus and Demophilus, who were alſo accomplices in it, fled. However, Phocion's ſon met with them, and executed his revenge upon them; which was almoſt the only good action he ever performed, as he had a very ſmall ſhare of his father's abilities, and not any of his virtues. Such is the fickleneſs and ſuch the injuſtice of popular governments; failings which, if we are to judge from univerſal experience, are abſolutely inſeparable from them.

Phocion, Phocis.

PHOCIS. (Demoſthenes, Strabo, Pauſanias); a country of Greece, contained between Bœotia to the eaſt and Locris to the weſt, but extending formerly from the Sinus Corinthiacus on the ſouth to the ſea of Eubœa on the north, and, according to Dionyſius, as far as Thermopylæ; but reduced afterwards to narrower bounds. *Phocenſes*, the people; *Phocicus*, the epithet, (Juſtin); *Bellum Phocicum*, the ſacred war which the Thebans and Philip of Macedon carried on againſt them for plundering the temple at Delphi; and by which Philip paved the way to the ſovereignty of all Greece, (Juſtin.) Its greateſt length was from north to ſouth, that is, from 38° 45′ to 39° 20′, or about 35 miles; but very narrow from eaſt to weſt, not extending to 30 miles, that is, from 23° 10′ to 23° 40′ at the wideſt, but about 23 miles towards the Corinthian bay, and much narrower ſtill towards the north. This country is generally allowed to have taken its name from Phocus the ſon of Ornytion, a native of Corinth; but having been ſoon after invaded by the Eginetæ, under the conduct of another Phocus, who was the ſon of Eacus king of Enopia, the memory of the firſt inſenſibly gave way to that of the ſecond.

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In Phocis there were many celebrated mountains, ſuch as Cythæron, HELICON, and PARNASSUS. The laſt two we have already noticed in the order of the alphabet. Cythæron was conſecrated to the muſes as well as the other two, and was conſequently much celebrated by the poets. Both it and Helicon contend with Mount Parnaſſus for height and magnitude. There were no remarkable rivers in Phocis except Cephiſus, which runs from the foot of Parnaſſus northward, and empties itſelf in the Pindus, which was near the boundary of that kingdom. It had ſeveral very conſiderable cities; ſuch as Cyrra, Criſſa, and ANTECYRA, which, according to Ptolemy, were on the ſea coaſt; and [illegible], Delphi, Daulis, Elatia, Ergoſthenia, and Baulia, which were inland towns. Elatia was the largeſt and richeſt after Delphi.

Deucalion was king of that part of Phocis which lies about Parnaſſus, at the time that Cecrops flouriſhed in Attica; but the Phocians afterwards formed themſelves into a commonwealth, to be governed by their general aſſemblies, the members of which were choſen from among themſelves, and were changed as often as occaſion required. Of the hiſtory of the Phocians but little is known till the time of the holy war, of which we have the following account in the Ancient Univerſal Hiſtory.

"The Phocians having preſumed to plough the territories of the city of Cyrra, conſecrated to the Delphic god, were ſummoned by the other Grecian ſtates before the court of the Amphictyons, where a conſiderable fine was impoſed upon them for their ſacrilege. They refuſed to pay it, on pretence that it was too large; and at the next aſſembly their dominions were adjudged confiſcated to the uſe of the temple. This ſecond ſentence exaſperated the Phocians ſtill more; who, at the inſtigation of one Philomelus, or, as he is called by Plutarch, Philomedes, ſeized upon the temple, plundered it of its treaſure, and held the ſacred depoſitum for a conſiderable time.[f] This ſecond crime occaſioned another aſſembly of the Amphictyons, the reſult of which was a formal declaration of war againſt the Phocians. The quarrel being become more general, the ſeveral ſtates took part in it according to their inclinations or intereſt. Athens, Sparta, and ſome others of the Peloponneſians, declared for the Phocians; and the Thebans, Theſſalians, Locrians, and other neighbouring ſtates, againſt them. A war was commenced with great fury on both ſides, and ſtyled *the holy war*, which laſted ten years; during which the Phocians, having hired a number of foreign troops, made an obſtinate defence, and would in all probability have held out much longer had not Philip of Macedon given the finiſhing ſtroke to their total defeat and puniſhment. The war being ended, the grand council aſſembled again, and impoſed an annual fine of 60 talents upon the Phocians, to be paid to the temple, and continued till they had fully repaired the damage it had ſuſtained from them; and, till this reparation ſhould be made, they were excluded from dwelling in walled towns, and from having any vote in the grand aſſembly. They did not, however, continue long under this heavy ſentence: their known bravery made their aſſiſtance ſo neceſſary to the reſt, that they were glad to remit it; after which remiſſion they continued to behave with their uſual courage and reſolution, and ſoon obliterated their former guilt."

We cannot finiſh this article without mentioning more particularly Daulis, rendered famous, not ſo much for its extent or richneſs, as for the ſtature and prowefs of its inhabitants; but ſtill more for the inhuman repaſt which was ſerved up to Tereus king of Thrace by the women of this city, by whom he was ſoon after murdered for the double injury he had done to his ſiſter-in-law Philomela, daughter of Pandion king of Athens. See PHILOMELA.

PHOEBUS, one of the names given by ancient mythologiſts to the Sun, Sol, or Apollo. See APOLLO.

PHOENICIA, or more properly PHOENICE, the ancient name of a country lying between the 34th and 36th degrees of north latitude; bounded by Syria on the north and eaſt, by Judæa on the ſouth, and by the Mediterranean on the weſt. Whence it borrowed its name is not abſolutely certain. Some derive it from one Phœnix; others from the Greek word *phœnix*, ſignifying a *palm* or *date*, as that tree remarkably abounded in this country. Some again ſuppoſe that Phœnice is originally a tranſlation of the Hebrew word *Edom*, from the Edomites who fled thither in the days of David. By the contraction of Canaan it was alſo called *Chna*, and anciently *Rhabbothin* and *Colpitis* (A). The Jews commonly named it *Canaan*; though ſome part of it, at leaſt, they knew by the name of *Syrophœnice* (B). Bochart tells us that the moſt probable etymology is *Phene Anak*, i. e. "the deſcendants of Anak." Such were the names peculiar to this ſmall country; though Phœnice was ſometimes extended to all the maritime countries of Syria and Judea, and Canaan to the Philiſtines, and even to the Amalekites. On the contrary, theſe two names, and the reſt, were moſt generally ſwallowed up by thoſe of Paleſtine and Syria (C).

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There is ſome diſagreement among authors with reſpect to the northern limits of this country. Ptolemy makes the river Eleutherus the boundary of Phœnice to the north; but Pliny, Mela, and Stephanus, place it in the iſland of Aradus, lying north of that river. Strabo obſerves, that ſome will have the river Eleutherus to be the boundary of Seleucis, on the ſide of Phœnice and Cœleſyria. On the coaſt of Phœnice, and ſouth of the river Eleutherus, ſtood the following cities: SIMYRA, Orthoſia, TRIPOLIS, Botrys, Byblus, Palæbyblus, Berytus, SIDON, SAREPTA, TYRUS, Palætyrus.

Phœnice extended, according to Ptolemy, even beyond Mount Carmel; for that geographer places in Phœnice not only Ecdippa and Ptolemais, but Sycaminum and Dæra, which ſtand ſouth of that mountain. Theſe, however, properly ſpeaking, belonged to Paleſtine. We will not take upon us to mark out the bounds of the midland Phœnice. Ptolemy reckons in it the following towns; Arca, Palæbyblus (Old Byblus), Gabala, and Cæſaria Paniæ. This province was conſiderably extended in the times of Chriſtianity; when, being conſidered as a province of Syria, it included not only Damaſcus but Palmyra alſo.

The ſoil of this country is good, and productive of many neceſſaries for food and clothing. The air is wholeſome, and the climate agreeable. It is plentifully watered by ſmall rivers; which, running down from Mount Libanus, ſometimes ſwell to an immoderate degree, either increaſed by the melting of the ſnows on that mountain, or by heavy rains. Upon theſe occaſions they overflow, to the great danger and hinderance of the traveller and damage of the country. Among theſe rivers is that of ADONIS.

(A) This laſt name is a tranſlation of the firſt. *Rabhotſen* is in Hebrew a *great gulf* or *bay*. From *rabhotſen*, by changing the Hebrew *tſ* into the Greek *t*, comes *rabboten*; and, with a little variation, *rhabbothin*. Κολπος, *colpos*, is Greek alſo for a *bay* or *gulf*; whence it appears that *colpitis* or *colpites* is a tranſlation of *rabbothin*.

(B) Bochart ſuppoſes that the borderers, both upon the Phœnician and Syrian ſide, were called by the common name of Syrophœnicians, as partaking equally of both nations.

(C) Or rather Phœnice, Paleſtine, and Syria, were promiſcuouſly uſed for each other, and particularly the two former. Phœnice and Paleſtine, ſays Stephanus Byzantinus, were the ſame. As for Syria, we have already obſerved, that in its largeſt extent it ſometimes comprehended Phœnice and Cœleſyria. Herodotus plainly confounds theſe three names; we mean, uſes one for the other indifferently.

It is univerſally allowed that the Phœnicians were Canaanites (D) by deſcent: nothing is plainer or leſs conteſted, and therefore it were time loſt to prove it. We ſhall only add, that their blood muſt have been mixed with that of foreigners in proceſs of time, as it happens in all trading places; and that many ſtrange families muſt have ſettled among them, who could conſequently lay no claim to this remote origin, how much ſoever they may have been called Phœnicians, and reckoned of the ſame deſcent with the ancient proprietors.

The Phœnicians were governed by kings; and their territory, as ſmall a ſlip as it was, included ſeveral kingdoms; namely, thoſe of Sidon, Tyre, Aradus, Berytus, and Byblus. In this particular they imitated and adhered to the primitive government of their forefathers; who, like the other Canaanites, were under many petty princes, to whom they allowed the ſovereign dignity, reſerving to themſelves the natural rights and liberties of mankind. Of their civil laws we have no particular ſyſtem.

With regard to religion, the Phœnicians were the moſt groſs and abominable idolaters. The Baal-berith, Baalzebub, Baalſamen, &c. mentioned in Scripture, were ſome of the Phœnician gods; as were alſo the Moloch, Aſhtaroth, and Thammuz, mentioned in the ſacred writings.—The word *Baal*, in itſelf an appellative, was no doubt applied to the true God, until he rejected it on account of its being ſo much profaned by the idolaters. The name was not appropriated to any particular deity among the idolatrous nations, but was common to many; however, it was generally imagined that one great God preſided over all the reſt. Among the Phœnicians this deity was named *Baal-ſamen;* whom the Hebrews would have called *Baal ſhemim*, or the God of heaven. In all probability this was alſo the principal Carthaginian deity, though his Punic name is unknown. We have many religious rites of the Carthaginians handed down to us by the Greek and Roman writers; but they all beſtowed names of their own gods upon thoſe of the Carthaginians, which leads us to a knowledge of the correſpondence between the characters of the Phœnician and European deities. The principal deity of Carthage, according to Diodorus Siculus, was Chronus or Saturn. The ſacrifices offered up to him were children of the beſt families. Our author alſo tells us, that the Carthaginians had a brazen ſtatue or coloſſus of this god, the hands of which were extended in act to receive, and bent downwards in ſuch a manner, that the child laid thereon immediately fell down into a hollow where there was a fiery furnace. He adds alſo, that this inhuman practice ſeemed to confirm a tradition, handed down to the Greeks from very early antiquity, viz. that Saturn devoured his own children.

The goddeſs Cœleſtis, or Urania, was held in the higheſt veneration by the Carthaginians. She is thought to have been the ſame with the queen of heaven mentioned in Jeremiah, the Juno Olympia of the Greeks. According to Heſychius, the ſame word applied in the Punic language both to Juno and Venus: Nay, the ancient Greeks frequently confound Juno, Venus, and Diana or the moon, all together; which is to be attributed to the Egyptians and Phœnicians, from whom they received their ſyſtem of religion; who ſeem in the moſt ancient times to have had but one name for them all. Beſides theſe there were ſeveral other deities of later date, who were worſhipped among the Phœnicians, particularly thoſe of Tyre, and conſequently among the Carthaginians alſo. Theſe were Jupiter, Apollo, Mars, and Bacchus. Jupiter was worſhipped under the name of *Belus* or *Baal*. To him they addreſſed their oaths; and placed him for the moſt part, as there is reaſon to believe, at the head of their treaties. The ſame name was alſo given to the other two, whence they were frequently miſtaken for one another. Apollo or the ſun, went either by this name ſimply, or by others of which this made a part.

The Carthaginian ſuperſtition, however, was not confined to theſe deities alone. They worſhipped alſo the fire, air, and other elements; and had gods of rivers, meads, &c. Nay, they paid divine honours to the ſpirits of their heroes, and even to men and women themſelves while yet in life; and in this adoration Hannibal the Great had for ſome time a ſhare, notwithſtanding the infamous conduct of his countrymen towards him at laſt. In order to worſhip thoſe gods with more conveniency on all occaſions, the Carthaginians had a kind of portable temples. Theſe were only covered chariots, in which were ſome ſmall images repreſenting their favourite deities; and which were drawn by oxen. They were alſo a kind of oracle; and their reſponſes were underſtood by the motion impreſſed upon the vehicle. This was likewiſe an Egyptian or Libyan cuſtom; and Tacitus informs us that the ancient Germans had ſomething of the ſame kind. The tabernacle of Moloch is thought to have been a machine of this kind; and it is not improbable that the whole was derived from the tabernacle of the Jews in the wilderneſs.

Beſides all the deities above-mentioned, we ſtill find another, named the *Dæmon* or *Genius* of Carthage, mentioned in the treaty made by Philip of Macedon and Hannibal. What this deity might be, we know not; however, it may be obſerved, that the pagan world in general believed in the exiſtence of demons, or intelligences who had a kind of middle nature between gods and men, and to whom the adminiſtration of the world was in a great meaſure committed. Hence it is no wonder that they ſhould have received religious honours. For when once mankind were poſſeſſed with the opinion that they were the miniſters of the gods, and truſted with the diſpenſation of their favours, as well as the in-

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(D) Bochart inſinuates that the Canaanites were aſhamed of their name, on account of the curſe denounced on their progenitor, and terrified by the wars ſo vigorouſly and ſucceſsfully waged on them by the Iſraelites, purely becauſe they were Canaanites; and that therefore, to avoid the ignominy of the one and the danger of the other, they abjured their old name, and changed it for Phœnicians, Syrians, Syrophœnicians, and Aſſyrians. Heidegger conjectures alſo that they were aſhamed of their anceſtor Canaan.

fliction of their puniſhments, it is natural to ſuppoſe that they would be deſirous of making their addreſſes to them. See ASTARTE and POLYTHEISM.

Herodotus ſuppoſes the Phœnicians to have been circumciſed; but Joſephus aſſerts, that none of the nations included under the vague name of Paleſtine and Syria uſed that rite, the Jews excepted; ſo that if the Phœnicians had anciently that cuſtom, they came in time to neglect it, and at length wholly laid it aſide. They abſtained however from the fleſh of ſwine.

Much is ſaid of their arts, ſciences, and manufactures; but as what we find concerning them is couched in general terms only, we cannot deſcant on particulars. The Sidonians, under which denomination we comprehend the Phœnicians in general, were of a moſt happy genius. They were from the beginning addicted to philoſophical exerciſes of the mind; inſomuch that a Sidonian, by name Moſchus, taught the doctrine of atoms before the Trojan war: and Abomenus of Tyre puzzled Solomon by the ſubtilty of his queſtions. Phœnice continued to be one of the ſeats of learning, and both Tyre and Sidon produced their philoſophers of later ages; namely, Boethus and Diodatus of Sidon, Antipater of Tyre, and Appollonius of the ſame place; who gave an account of the writings and diſciples of Zeno. For their language, ſee PHILOLOGY, n° 61. As to their manufactures, the glaſs of Sidon, the purple of Tyre, and the exceeding fine linen they wove, were the product of their own country, and their own invention: and for their extraordinary ſkill in working metals, in hewing timber and ſtone; in a word, for their perfect knowledge of what was ſolid, great, and ornamental in architecture—we need only put the reader in mind of the large ſhare they had in erecting and decorating the temple at Jeruſalem under their king Hiram. Their fame for taſte, deſign, and ingenious invention, was ſuch, that whatever was elegant, great, or pleaſing, whether in apparel, veſſels, or toys, was diſtinguiſhed by way of excellence with the epithet of Sidonian.

The Phœnicians were likewiſe celebrated merchants, navigators, and planters of colonies in foreign parts. As merchants, they may be ſaid to have engroſſed all the commerce of the weſtern world: as navigators, they were the boldeſt, the moſt experienced, and greateſt diſcoverers, of the ancient times: they had for many ages no rivals. In planting colonies they exerted themſelves ſo much, that, conſidering their habitation was little more than the ſlip of ground between Mount Libanus and the ſea, it is ſurpriſing how they could furniſh ſuch ſupplies of people, and not wholly depopulate their native country.

It is generally ſuppoſed that the Phœnicians were induced to deal in foreign commodities by their neighbourhood with the Syrians, who were perhaps the moſt ancient of thoſe who carried on a conſiderable and regular trade with the more eaſtern regions: and this conjecture appears probable at leaſt; for their own territory was but ſmall, and little able to afford any conſiderable exports, if we except manufactures: but that their manufactures were anyways conſiderable till they began to turn all the channels of trade into their own country, it is hard to believe. In Syria, which was a large country, they found ſtore of productions of the natural growth of that ſoil, and many choice and uſeful commodities brought from the eaſt. Thus, having a fair coaſt, with convenient harbours, on one ſide, and excellent materials for ſhip building on the other; perceiving how acceptable many commodities that Syria furniſhed would be in foreign parts, and being at the ſame time, perhaps, ſhewn the way by the Syrians themſelves, who may have navigated the Mediterranean—they turned all their thoughts to trade and navigation, and by an uncommon application ſoon eclipſed their maſters in that art.

It were in vain to talk of the Edomites, who fled hither in David's time; or to inquire why Herodotus ſuppoſes the Phœnicians came from the Red ſea: their origin we have already ſeen. That ſome of the Edomites fled into this country in the days of David, and that they were a trading people, is very evident: what improvements they brought with them into Phœnice, it is hard to ſay; and by the way, it is as difficult to aſcertain their numbers. In all probability they brought with them a knowledge of the Red ſea, and of the ſouth parts of Arabia, Egypt, and Ethiopia; and by their information made the Phœnicians acquainted with thoſe coaſts; by which means they were enabled to undertake voyages to thoſe parts, for Solomon, and Pharoah Necho, king of Egypt.

Their whole thoughts were employed on ſchemes to advance their commerce. They affected no empire but that of the ſea; and ſeemed to aim at nothing but the peaceable enjoyment of their trade. This they extended to all the known parts they could reach; to the Britiſh iſles, commonly underſtood by the Caſſiterides; to Spain, and other places in the ocean, both within and without the ſtraits of Gibraltar; and, in general, to all the ports of the Mediterranean, the Black ſea, and the lake Mæotis. In all theſe parts they had ſettlements and correſpondents, from which they drew what was uſeful to themſelves, or might be ſo to others; and thus they exerciſed the three great branches of trade, as it is commonly divided into importation, exportation, and tranſportation, in full latitude. Such was their ſea-trade; and for that which they carried on by land in Syria, Meſopotamia, Aſſyria, Babylonia, Perſia, Arabia, and even in India, it was of no leſs extent, and may give us an idea of what this people once was, how rich and how deſervedly their merchants are mentioned in Scripture as equal to princes. Their country was, at that time, the great warehouſe, where every thing that might either adminiſter to the neceſſities or luxury of mankind was to be found; which they diſtributed as they judged would be the beſt for their own intereſt. The purple of Tyre, the glaſs of Sidon, and the exceeding fine linen made in this country, together with other curious pieces of art in metals and wood, already mentioned, appear to have been the chief and almoſt only commodities of Phœnice itſelf. Indeed their territory was ſo ſmall, that it is not to be imagined they could afford to export any of their own growth; it is more likely that they rather wanted than abounded with the fruits of the earth.

Having thus ſpoken in general terms of their trade, we ſhall now touch upon their ſhipping and ſome things remarkable in their navigation. Their larger embarkations were of two ſorts; they divided them into round ſhips or gauli; and long ſhips, galleys, or triremes. When they drew up in line of battle, the gauli were diſpoſed

Phœnicopterus, Phœnix.

poſed at a ſmall diſtance from each other in the wings, or in the van and the rear: their triremes were contracted together in the centre. If, at any time, they obſerved that a ſtranger kept them company in their voyage, or followed in their track, they were ſure to get rid of him if they could, or deceive him if poſſible; in which policy they went ſo far, as to venture the loſs of their ſhips, and even their lives; ſo jealous were they of foreigners, and ſo tenaciouſly bent on keeping the whole trade to themſelves. In order to diſcourage other nations from engaging in commerce, they practiſed piracy, or pretended to be at war with ſuch as they met when they thought themſelves ſtrongeſt. This was but a natural ſtroke of policy in people who graſped at the whole commerce of the then known world. We muſt not forget here the famous fiſhery of Tyre, which ſo remarkably enriched that city. See Astronomy, n° 7. Ophir, and Tyre.

PHOENICOPTERUS, or Flamingo, a genus of birds belonging to the order of grallæ. See Ornithology *Index*.

PHOENIX, in *Aſtronomy*. See Astronomy *Index*.

Phoenix, the *Great Palm*, or *Date tree*, a genus of plants belonging to the order of palmæ. See Botany *Index*. As the account of this valuable plant already given in its proper place, under Botany, is rather ſhort to be ſatisfactory, we ſhall here enter a little more into the detail of its natural hiſtory. There is only one ſpecies, viz. the dactylifera, or common date-tree, a native of Africa and eaſtern countries, where it grows to 50, 60, and 100 feet high. The trunk is round, upright, and ſtudded with protuberances, which are the veſtiges of the decayed leaves. From the top iſſues forth a cluſter of leaves or branches eight or nine feet long, extending all around like an umbrella, and bending a little towards the earth. The bottom part produces a number of ſtalks like thoſe of the middle, but ſeldom ſhooting ſo high as four or five feet. Theſe ſtalks, ſays Adanſon, diffuſe the tree very conſiderably; ſo that, wherever it naturally grows in foreſts, it is extremely difficult to open a paſſage through its prickly leaves. The date-tree was introduced into Jamaica ſoon after the conqueſt of the iſland by the Spaniards. There are however, but few of them in Jamaica at this time. The fruit is ſomewhat in the ſhape of an acorn. It is compoſed of a thin, light, and gloſſy membrane, ſomewhat pellucid and yellowiſh; which contains a fine, ſoft, and pulpy fruit, which is firm, ſweet, and ſomewhat vinous to the taſte, eſculent, and wholeſome; and within this is incloſed a ſolid, tough, and hard kernel, of a pale grey colour on the outſide, and finely marbled within like the nutmeg. For medicinal uſe dates are to be choſen large, full, freſh, yellow on the ſurface, ſoft and tender, not too much wrinkled; ſuch as have a vinous taſte, and do not rattle when ſhaken. They are produced in many parts of Europe, but never ripen perfectly there. The beſt are brought from Tunis; they are alſo very fine and good in Egypt and in many parts of the eaſt. Thoſe of Spain and France look well; but are never perfectly ripe, and very ſubject to decay. They are preſerved three different ways; ſome preſſed and dry; others preſſed more moderately, and again moiſtened with their own juice; and others not preſſed at all, but moiſtened with the juice of other dates, as they are packed up, which is done in baskets or ſkins. Thoſe preſerved in this laſt way are much the beſt. Dates have always been eſteemed moderately ſtrengthening and aſtringent.

Though the date tree grows everywhere indiſcriminately on the northern coaſts of Africa, it is not cultivated with care, except beyond Mount Atlas; becauſe the heat is not ſufficiently powerful along the coaſts to bring the fruits to proper maturity. We ſhall here extract ſome obſervations from Mr Des Fontaines reſpecting the manner of cultivating it in Barbary, and on the different uſes to which it is applied. All that part of the Zaara which is near Mount Atlas, and the only part of this vaſt deſert which is inhabited, produces very little corn: the ſoil being ſandy, and burnt up by the ſun, is almoſt entirely unfit for the cultivation of grain, its only productions of this kind being a little barley, maize, and ſorgo. The date-tree, however, ſupplies the deficiency of corn to the inhabitants of theſe countries, and furniſhes them with almoſt the whole of their ſubſiſtence. They have flocks of ſheep; but as they are not numerous, they preſerve them for the ſake of their wool; beſides, the fleſh of theſe animals is very unwholeſome food in countries that are exceſſively warm; and theſe people, though ignorant, have probably been enabled by experience to know that it was ſalutary for them to abſtain from it. The date trees are planted without any order, at the diſtance of 12 feet one from the other, in the neighbourhood of rivulets and ſtreams which iſſue from the ſand. Foreſts of them may be ſeen here and there, ſome of which are ſeveral leagues in circumference. The extent of theſe plantations depends upon the quantity of water which can be procured to water them: for they require much moiſture. All theſe foreſts are intermixed with orange, almond, and pomegranate trees, and with vines which twiſt round the trunks of the date trees; and the heat is ſtrong enough to ripen the fruit, though they are never expoſed to the ſun.

Along the rivulets and ſtreams, dykes are erected to ſtop the courſe of their waters, in order that they may be diſtributed amongſt the date trees by means of ſmall canals. The number of canals is fixed for each individual; and in ſeveral cantons, to have a right to them, the proprietors are obliged to pay an annual ſum proportionable to the number and extent of their plantations. Care is taken to till the earth well, and to raiſe a circular border around the root of each tree, that the water may remain longer and in larger quantity. The date trees are watered in every ſeaſon, but more particularly during the great heats of ſummer.

It is generally in winter that new plantations of this tree are formed. For this purpoſe thoſe who cultivate them take ſhoots of thoſe which produce the beſt dates, and plant them at a ſmall diſtance one from the other. At the end of three or four years theſe ſhoots, if they have been properly taken care of, begin to bear fruit; but this fruit is as yet dry, without ſweetneſs, and even without kernels; they never reach the higheſt degree of perfection of which they are ſuſceptible till they are about 15 or 20 years old.

Theſe plants are however produced from the ſeeds taken out of the fruit, provided they are freſh. They ſhould be ſown in pots filled with light rich earth, and plunged into a moderate hotbed of tanners bark, and ſhould be kept in a moderate temperature of heat, and the earth frequently refreſhed with water. When the plants are come up to a proper ſize, they ſhould be each planted in a ſeparate ſmall pot, filled with the ſame light earth, and plunged into a hotbed again, obſerving to refreſh them with water, as alſo to let them have air in proportion to the warmth of the ſeaſon and the bed in which they are placed. During the ſummer time they ſhould remain in the ſame hotbed; but in the beginning of Auguſt, they ſhould have a great ſhare of air to harden them againſt the approach of winter; for if they are too much forced, they will be ſo tender as not to be preſerved through the winter without much difficulty, eſpecially if you have not the conveniency of a bark ſtove to keep them in. The ſoil in which theſe plants ſhould be placed, muſt be compoſed in the following manner, viz. half of light freſh earth taken from a paſture-ground, the other half ſea ſand and rotten dung or tanners bark in equal proportion; theſe ſhould be carefully mixed, and laid in a heap three or four months at leaſt before it is uſed, but ſhould be often turned over to prevent the growth of weeds, and to ſweeten the earth.

The trees, however, which ſpring from ſeed never produce ſo good dates as thoſe that are raiſed from ſhoots; they being always poor and ill taſted. It is undoubtedly by force of cultivation, and after ſeveral generations, that they acquire a good quality.

The date trees which have been originally ſown, grow rapidly, and we have been aſſured that they bear fruit in the fourth or fifth year. Care is taken to cut the inferior branches of the date tree in proportion as they riſe; and a piece of the root is always left of ſome inches in length, which affords the eaſy means of climbing to the ſummit. Theſe trees live a long time, according to the account of the Arabs; and in order to prove it, they ſay that when they have attained to their full growth, no change is obſerved in them for the ſpace of three generations.

The number of females which are cultivated is much ſuperior to that of the males, becauſe they are much more profitable. The ſexual organs of the date tree grow, as is well known, upon different ſtalks, and theſe trees flower in the months of April and May, at which time the Arabs cut the male branches to impregnate the female. For this purpoſe, they make an inciſion in the trunk of each branch which they wiſh to produce fruit, and place in it a ſtalk of male flowers; without this precaution the date tree would produce only abortive fruit (A). In ſome cantons the male branches are only ſhaken over the female. The practice of impregnating the date tree in this manner is very ancient. Pliny deſcribes it very accurately in that part of his work where he treats of the palm tree.

There is ſcarcely any part of the date tree which is not uſeful. The wood, though of a ſpongy texture, laſts ſuch a number of years, that the inhabitants of the country ſay it is incorruptible. They employ it for making beams and inſtruments of huſbandry; it burns ſlowly, but the coals which reſult from its combuſtion are very ſtrong, and produce a great heat.

The Arabs ſtrip the bark and fibrous parts from the young date trees, and eat the ſubſtance which is in the centre; it is very nouriſhing, and has a ſweet taſte: it is known by the name of the marrow of the date tree. They eat alſo the leaves, when they are young and tender, with lemon juice; the old ones are laid out to dry, and are employed for making mats and other works of the ſame kind, which are much uſed, and with which they carry on a conſiderable trade in the interior parts of the country. From the ſides of the ſtumps of the branches which have been left ariſe a great number of delicate filaments, of which they make ropes, and which might ſerve to fabricate cloth.

Of the freſh dates and ſugar, ſays Haſſelquiſt, the Egyptians make a conſerve, which has a very pleaſant taſte. In Egypt they uſe the leaves as fly-flaps, for driving away the numerous inſects which prove ſo troubleſome in hot countries. The hard boughs are uſed for fences and other purpoſes of huſbandry; the principal ſtem for building. The fruit, before it is ripe, is ſomewhat aſtringent; but when thoroughly mature, is of the nature of the fig. The Senegal dates are ſhorter than thoſe of Egypt, but much thicker in the pulp, which is ſaid to have a ſugary agreeable taſte, ſuperior to that of the beſt dates of the Levant.

A white liquor, known by the name of *milk*, is drawn alſo from the date tree. To obtain it, all the branches are cut from the ſummit of one of theſe trees, and after ſeveral inciſions have been made in it, they are covered with leaves, in order that the heat of the ſun may not dry it.

The ſap drops down into a veſſel placed to receive it, at the bottom of a circular groove, made below the inciſions. The milk of the date tree has a ſweet and agreeable taſte when it is new; it is very refreſhing, and it is even given to ſick people to drink, but it generally turns ſour at the end of 24 hours. Old trees are choſen for this operation, becauſe the cutting of the branches, and the large quantity of ſap which flows from them, greatly exhauſt them, and often cauſe them to decay.

The male flowers of the date tree are alſo uſeful.

(A) The celebrated Linnæus, in his Diſſertation on the Sexes of Plants, ſpeaking of the date tree, ſays, "A female date-bearing palm flowered many years at Berlin without producing any ſeeds; but the Berlin people taking care to have ſome of the bloſſoms of the male tree, which was then flowering at Leipſic, ſent to them by the poſt, they obtained fruit by theſe means; and ſome dates, the offspring of this impregnation, being planted in my garden, ſprung up, and to this day continue to grow vigorouſly. Kœmpfer formerly told us, how neceſſary it was found by the oriental people, who live upon the produce of palm-trees, and are the true *Lotophagi*, to plant ſome male trees among the females, if they hoped for any fruit: hence it is the practice of thoſe who make war in that part of the world to cut down all the male palms, that a famine may afflict their proprietors; ſometimes even the inhabitants themſelves deſtroy the male trees when they dread an invaſion, that their enemies may find no ſuſtenance in the country."

They are eaten when ſtill tender, mixed up with a little lemon juice. They are reckoned to be very provocative; the odour which they exhale is probably the cauſe of this property being aſcribed to them.

Theſe date trees are very lucrative to the inhabitants of the deſert. Some of them produce 20 bunches of dates; but care is always taken to lop off a part of them, that thoſe which remain may become larger; 10 or 12 bunches only are left on the moſt vigorous trees.

It is reckoned that a good tree produces, one year with another, about the value of 10 or 12 [illegible] to the proprietor. A pretty conſiderable trade is carried on with dates in the interior part of the country, and large quantities of them are exported to France and Italy. The crop is gathered towards the end of November. When the bunches are taken from the tree, they are hung up in ſome very dry place where they may be ſheltered and ſecure from inſects.

Dates afford wholeſome nouriſhment, and have a very agreeable taſte when they are freſh. The Arabs eat them without ſeaſoning. They dry and harden them in the ſun, to reduce them to a kind of meal, which they lay up in ſtore to ſupply themſelves with food during the long journeys which they often undertake acroſs their deſerts. This ſimple food is ſufficient to nouriſh them for a long time.—The inhabitants of the Zaara procure alſo from their dates a kind of honey which is exceedingly ſweet. For this purpoſe they chooſe thoſe which have the ſofteſt pulp; and having put them into a large jar with a hole in the bottom, they ſqueeze them by placing over them a weight of eight or ten pounds. —The moſt fluid part of the ſubſtance, which drops through the hole, is what they call the *honey* of the date.

Even the ſtones, though very hard, are not thrown away. They give them to their camels and ſheep as food, after they have bruiſed them or laid them to ſoften in water.

The date, as well as other trees which are cultivated, exhibits great variety in its fruit, with reſpect to ſhape, ſize, quality, and even colour. There are reckoned to be at leaſt twenty different kinds. Dates are very liable to be pierced by worms, and they ſoon corrupt in moiſt or rainy weather.

From what has been ſaid, it may eaſily be perceived, that there is, perhaps, no tree whatever uſed for ſo many and ſo valuable purpoſes as the date tree.

Phoenix, in antiquity, a famous bird, which is generally looked upon by the moderns as fabulous. The ancients ſpeak of this bird as ſingle, or the only one of its kind; they deſcribe it as of the ſize of an eagle; its head finely creſted with a beautiful plumage, its neck covered with feathers of a gold colour, and the reſt of its body purple, only the tail white, and the eyes ſparkling like ſtars: they hold, that it lives 500 or 600 years in the wilderneſs; that when thus advanced in age, it builds itſelf a pile of ſweet wood and aromatic gums, and fires it with the waſting of its wings, and thus burns itſelf; and that from its aſhes ariſes a worm, which in time grows up to be a phœnix. Hence the Phœnicians gave the name of *phœnix* to the palm-tree; becauſe when burnt down to the root it riſes again fairer than ever.

In the ſixth book of the Annals of Tacitus, ſect. 28. it is obſerved that, in the year of Rome 787, the phœnix reviſited Egypt; which occaſioned among the learned much ſpeculation. This being is ſacred to the ſun. Of its longevity the accounts are various. The common perſuaſion is, as we have mentioned above, that it lives 500 years; though by ſome the date is extended to 1461. The ſeveral eras when the phœnix has been ſeen are fixed by tradition. The firſt, we are told, was in the reign of Seſoſtris; the ſecond in that of Amaſis; and, in the period when Ptolemy the third of the Macedonian race was ſeated on the throne of Egypt, another phœnix directed its flight towards Heliopolis. When to theſe circumſtances are added the brilliant appearance of the phœnix, and the tale that it makes frequent excurſions with a load on its back, and that when, by having made the experiment through a long tract of air, it gains ſufficient confidence in its own vigour, it takes up the body of its father and flies with it to the altar of the ſun to be there conſumed; it cannot but appear probable, that the learned of Egypt had enveloped under this allegory the philoſophy of comets.

Phoenix, ſon of Amyntor king of Argos by Cleobule or Hippodamia, was preceptor to young Achilles. His father having proved faithleſs to his wife, through fondneſs for a concubine called *Clytia*, Cleobule, who was jealous of him, perſuaded her ſon Phœnix to ingratiate himſelf with his father's miſtreſs. Phœnix eaſily ſucceeded; but Amyntor diſcovering his intrigues, he drew a curſe upon him, and the ſon was ſoon after deprived of his ſight by divine vengeance. Some ſay that Amyntor himſelf put out his ſon's eyes, which ſo cruelly provoked him that he meditated the death of his father. Reaſon and piety, however, prevailed over paſſion; and that he might not become a parricide, Phœnix fled from Argos to the court of Peleus king of Phthia. Here he was treated with tenderneſs; Peleus carried him to Chiron, who reſtored his eyeſight; ſoon after which he was made preceptor to Achilles, his benefactor's ſon. He was alſo preſented with the government of many cities, and made king of the Dolopes. He went with his pupil to the Trojan war; and Achilles was ever grateful for the inſtructions and precepts which he had received from him. After the death of Achilles, Phœnix, with others, was commiſſioned by the Greeks to return into Greece, to bring to the war young Pyrrhus. This commiſſion he ſucceſsfully performed; and after the fall of Troy, he returned with Pyrrhus, and died in Thrace. He was buried, according to Strabo, near Trachinia, where a ſmall river in the neighbourhood received the name of *Phœnix*. There was another Phœnix, ſon of Agenor, by a nymph who was called *Telephaſſa*, according to Apollodorus and Moſchus, or, according to others, *Epimeduſa*, *Perimeda*, or *Agriope*. He was, like his brother Cadmus, and Cilix, ſent by his father in purſuit of his ſiſter Europa, whom Jupiter had carried away under the form of a bull; and when his inquiries proved unſucceſsful, he ſettled in a country, which, according to ſome, was from him called *Phœnicia*. From him, as ſome ſuppoſe, the Carthaginians were called *Pœni*.

PHOLAS, a genus of ſhell-fiſh belonging to the order of vermes teſtacea. See Conchology *Index*.

The word *pholas* is derived from the Greek, and ſignifies ſomething which lies hid. This name they de-from their property of making themſelves holes in the earth, ſand, wood, or ſtone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can know with certainty is, that they muſt have penetrated theſe ſubſtances when very ſmall; becauſe the entrance of the hole in which the pholas lodges is always much leſs than the inner part of it, and indeed than the ſhell of the pholas itſelf. Hence ſome have ſuppoſed that they were hatched in holes accidentally formed in ſtones, and that they naturally grew of ſuch a ſhape as was neceſſary to fill the cavity.

The holes in which the pholades lodge are uſually twice as deep, at leaſt, as the ſhells themſelves are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their poſition is uſually ſomewhat oblique to the horizon. The openings of theſe holes are what betray the pholas being in the ſtone; but they are always very ſmall in proportion to the ſize of the fiſh. There ſeems to be no progreſſive motion of any animal in nature ſo ſlow as that of the pholas; it is immerſed in the hole, and has no movement except a ſmall one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, ſinking itſelf deeper in the ſtone as it increaſes itſelf in bulk. That part by means of which it performs this, is a fleſhy ſubſtance placed near the lower extremity of the ſhell; it is of the ſhape of a lozenge, and is conſiderably large in proportion to the ſize of the animal; and though it be of a ſoft ſubſtance, it is not to be wondered at that in ſo long a time it is able, by conſtant work, to burrow into a hard ſtone. The manner of their performing this may be ſeen by taking one of them out of the ſtone, and placing it upon ſome ſoft clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themſelves in the mud in as large a hole as they had taken many years to make in the ſtone. They find little reſiſtance in ſo ſoft a ſubſtance; and the neceſſity of their hiding themſelves evidently makes them haſten their work. The animal is lodged in the lower half of the hole in the ſtone, and the upper half is filled up by a pipe of a fleſhy ſubſtance and conic figure, truncated at the end: this they uſually extend to the orifice of the hole, and place on a level with the ſurface of the ſtone; but they ſeldom extend it any farther than this. The pipe, though it appears ſingle, is in reality compoſed of two pipes, or at leaſt it is compoſed of two parts ſeparated by a membrane. The uſe of this pipe or proboſcis is the ſame with that of the proboſcis of other ſhell-fiſh, to take in ſea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a ſmall green veſſel, the uſe of which has not yet been diſcovered. This, when plunged in ſpirit-of-wine, becomes of a purple colour: but its colour on linen does not become purple in the ſun like that of the murex.

The pholas is remarkable for its luminous quality, which was noticed by Pliny, who obſerves that it ſhines in the mouth of the perſon who eats it; and if it touch his hands or clothes, it makes them luminous. He alſo ſays that the light depends upon its moiſture. The light of this fiſh has furniſhed matter for various obſervations and experiments to M. Reaumur and the Bolognian academicians, eſpecially Beccarius, who took ſo much pains with the ſubject of phoſphoreal light.

M. Reaumur obſerves, that whereas other fiſhes give light when they tend to putreſcence, this is more luminous in proportion to its being freſh; that when they are dried, their light will revive if they be moiſtened either with freſh or ſalt water, but that brandy immediately extinguiſhes it. He endeavoured to make this light permanent, but none of his ſchemes ſucceeded.

The attention of the Bolognian academicians was engaged to this ſubject by M. F. Marſilius in 1724, who brought a number of theſe fiſhes, and the ſtones in which they were incloſed, to Bologna, on purpoſe for their examination.

Beccarius obſerved, that though this fiſh ceaſed to ſhine when it became putrid, yet that in its moſt putrid ſtate it would ſhine, and make the water in which it was immerſed luminous when it was agitated. Galeatius and Montius found that wine or vinegar extinguiſhed this light; that in common oil it continued ſome days, but in rectified ſpirit of wine or urine hardly a minute.

In order to obſerve in what manner this light was affected by different degrees of heat, they made uſe of a Reaumur's thermometer, and found that water rendered luminous by theſe fiſhes increaſed in light till the heat arrived to 45°, but that it then became ſuddenly extinct, and could not be revived again.

In the experiments of Beccarius, a ſolution of ſea-ſalt increaſed the light of the luminous water; a ſolution of nitre did not increaſe it quite ſo much. Sal ammoniac diminiſhed it a little, oil of tartar *per deliquium* nearly extinguiſhed it, and the acids entirely. This water, poured upon freſh calcined gypſum, rock-cryſtal, ceruſe, or ſugar, became more luminous. He alſo tried the effects of it when poured upon various other ſubſtances, but there was nothing very remarkable in them. Afterwards, uſing luminous milk, he found that oil of vitriol extinguiſhed the light, but that of tartar increaſed it.

This gentleman had the curioſity to try how differently coloured ſubſtances were affected by this kind of light; and having, for this purpoſe, dipped ſeveral ribbons in it, the white came out the brighteſt, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light, that was perceived in this caſe. He then dipped boards painted with the different colours, and alſo glaſs tubes filled with ſubſtances of different colours, in water rendered luminous by the fiſhes. In both theſe caſes, the red was hardly viſible, the yellow was the brighteſt, and the violet the dulleſt. But on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glaſſes, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the moſt luminous. A ſingle pholas made ſeven ounces of milk ſo luminous, that the faces of perſons might be diſtinguiſhed by it, and it looked as if it were tranſparent.

Air appeared to be neceſſary to this light: for when Beccarius put the luminous milk into glaſs tubes, no agitation would make it ſhine unleſs bubbles of air were mixed

Pholeys.

ed with it. Alſo Montius and Galeatius found, that, in an exhauſted receiver, the pholas loſt its light, but the water was ſometimes made more luminous: which they aſcribed to the riſing of bubbles of air through it.

Beccarius, as well as Reaumur, had many ſchemes to render the light of theſe pholades permanent. For this purpoſe he kneaded the juice into a kind of paſte with flour, and found that it would give light when it was immerſed in warm water; but it anſwered beſt to preſerve the fiſh in honey. In any other method of preſervation, the property of becoming luminous would not continue longer than ſix months, but in honey it had laſted above a year; and then it would, when plunged in warm water, give as much light as ever it had done. See Barbut's *Genera Vermium*, p. 14. &c.

PHOLEYS, or **FOULIES**, are a people of Africa, of very peculiar manners. Some authors tell us, that the kingdom of Pholey, from whence they derive their name, is divided from that of Jaloff by a lake called in the language of the Mundingoes *Cayor;* and that it ſtretches from eaſt to weſt about 180 miles; but that, though it extends a great way ſouth, its limits in that direction are not exactly aſcertained.

Mr Moore, however, gives a very different account, and ſays, that the Pholeys live in clans, build towns, and are in very kingdom and country on each ſide of the river; yet are not ſubject to any of the kings of the country, though they live in their territories; for if they are uſed ill in one nation, they break up their towns, and remove to another. They have chiefs of their own, who rule with ſuch moderation, that every act of government ſeems rather an act of the people than of one man. This form of government is eaſily adminiſtered, becauſe the people are of a good and quiet diſpoſition, and ſo well inſtructed in what is juſt and right, that a man who does ill expoſes himſelf to univerſal contempt.

The natives of all theſe countries, not being avaricious of land, deſire no more than they can uſe; and as they do not plough with horſes or other cattle, they can uſe but very little; and hence the kings willingly allow the Pholeys to live in their dominions, and cultivate the earth.

The Pholeys have in general a tawney complexion, though many of them are of as deep a black as the Mundingoes; and it is ſuppoſed that their alliances with the Moors have given them the mixed colour between the true olive and the black. They are rather of a low ſtature, but have a genteel and eaſy ſhape, with an air peculiarly delicate and agreeable.

Though they are ſtrangers in the country, they are the greateſt planters in it. They are extremely induſtrious and frugal, and raiſe much more corn and cotton than they conſume, which they ſell at reaſonable rates; and are ſo remarkable for their hoſpitality, that the natives eſteem it a bleſſing to have a Pholey town in their neighbourhood; and their behaviour has gained them ſuch reputation, that it is eſteemed infamous for any one to treat them in an unhoſpitable manner. Their humanity extends to all, but they are doubly kind to people of their race; and if they know of any one of their body being made a ſlave, they will readily redeem him. As they have plenty of food, they never ſuffer any of their own people to want; but ſupport the old, the blind, and the lame, equally with the others.

Pholeys, Pholis.

Theſe people are ſeldom angry; and Mr Moore obſerves that he never heard them abuſe each other; yet this mildneſs is far from proceeding from want of courage, they being as brave as any people of Africa, and very expert in the uſe of their arms, which are javelins, cuttaſſes, bows and arrows, and upon occaſion guns. They uſually ſettle near ſome Mundingo town, there being ſcarce any of note up the river that has not a Pholey town near it. Moſt of them ſpeak Arabic, which is taught in their ſchools; and they are able to read the Koran in that language, though they have a vulgar tongue called *Pholey*. They are ſtrict Mahometans, and ſcarce any of them will drink brandy, or any thing ſtronger than ſugar and water.

They are ſo ſkilful in the management of cattle, that the Mundingoes leave theirs to their care. The whole herd belonging to a town feed all day in the ſavannahs, and after the crop is off, in the rice grounds. They have a place without each town for their cattle, ſurrounded by a circular hedge, and within this encloſure they raiſe a ſtage about eight feet high, and eight or ten feet wide, covered with a thatched roof; all the ſides are open, and they aſcend to it by a ladder. Round this ſtage they fix a number of ſtakes, and when the cattle are brought up at night, each beaſt is tied to a ſeparate ſtake with a ſtrong rope made of the bark of trees. The cows are then milked, and four or five men ſtay upon the ſtage all night with their arms to guard them from the lions, tygers, and other wild beaſts. Their houſes are built in a very regular manner, they being round ſtructures, placed in rows at a diſtance from each other to avoid fire, and each of them has a thatched roof ſomewhat reſembling a high-crowned hat.

They are alſo great huntſmen, and not only kill lions, tygers, and other wild beaſts, but frequently go 20 or 30 in a company to hunt elephants; whoſe teeth they ſell, and whoſe fleſh they ſmoke-dry and eat, keeping it for ſeveral months together. As the elephants here generally go in droves of 100 or 200, they do great miſchief by pulling up the trees by the roots, and trampling down the corn; to prevent which, when the natives have any ſuſpicion of their coming, they make fires round their corn to keep them out.

They are almoſt the only people who make butter, and ſell cattle at ſome diſtance up the river. They are very particular in their dreſs, and never wear any other clothes but long robes of white cotton, which they make themſelves. They are always very clean, eſpecially the women, who keep their houſes exceedingly neat. They are, however, in ſome particulars very ſuperſtitious: for if they chance to know that any perſon who buys milk of them boils it, they will from thenceforth on no conſideration ſell that perſon any more, from their imagining that boiling the milk makes the cows dry.

PHOLIS, in *Natural Hiſtory*, is an old name for gypſums or plaſter-ſtones. The name is derived from φολις, a *ſcale* or *ſmall flake*, because they are compoſed of particles of that form.

PHOLIS, in *Ichthyology*, is the name of a ſmall anguilliform fiſh. The back is brown, the belly is white, the whole back and ſides are ſpotted, and the ſkin is ſoft, free of ſcales, but with a tough mucilaginous matter

ter like the eel. This ſpecies moſt of all approaches to the *alauda;* and though uſually larger, yet Mr Ray doubts whether it really differs from it in any thing eſſential; the diſtinction is its colour, which though a very obvious is certainly a very precarious one.

PHONICS, the doctrine or ſcience of ſound, otherwiſe called ACOUSTICS, which ſee.

PHORMIUM, FLAX-PLANT, (*Phormium tenax*, Forſt.) is a name which we may give to a plant that ſerves the inhabitants of New Zealand inſtead of hemp and flax. Of this plant there are two ſorts; the leaves of both reſemble thoſe of flags, but the flowers are ſmaller, and their cluſters more numerous; in one kind they are yellow, and in the other a deep red. Of the leaves of theſe plants, with very little preparation, they make all their common apparel, and alſo their ſtrings, lines, and cordage, for every purpoſe; which are ſo much ſtronger than any thing we can make with hemp, that they will not bear a compariſon.—From the ſame plant, by another preparation, they draw long ſlender fibres, which ſhine like ſilk, and are as white as ſnow: of theſe, which are very ſtrong, they make their fineſt cloths; and of the leaves, without any other preparation than ſplitting them into proper breadths, and tying the ſtrips together, they make their fiſhing-nets, ſome of which are of an enormous ſize.

The ſeeds of this valuable plant were brought over into England; but, upon the firſt trial, appeared to have loſt their vegetating power. We underſtand however that it has ſince ſucceeded with the aid of artificial heat.

The filamentous parts of different vegetables have been employed in different countries for the ſame mechanic uſes as hemp and flax among us. Putrefaction, and in ſome degree alkaline lixivia, deſtroy the pulpy or fleſhy matter, and leave the tough filaments entire. By curiouſly putrefying the leaf of a plant in water, we obtain the fine flexible fibres which conſtituted the baſis of the ribs and minute veins, and which form as it were a ſkeleton of the leaf. In Madagaſcar, different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in ſtrong ley; and ſome of theſe cloths are very fine, and approach to the ſoftneſs of ſilk, but in durability come ſhort of cotton: others are coarſer and ſtronger, and laſt thrice as long as cotton; and of theſe filaments they make ſails and cordage to their veſſels. The ſtalks of nettles are ſometimes uſed for like purpoſes, even in France; and Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by ſeveral, that muſlin and callico, and moſt of the Indian linens, are made of nettles. A ſtrong kind of cloth is ſaid to be prepared in ſome of the provinces of Sweden of hop-ſtalks; and in the Tranſactions of the Swediſh Academy for 1750, we have an account of an experiment relating to this ſubject: A quantity of ſtalks was gathered in autumn, which was equal in bulk to a quantity of flax ſufficient to yield a pound after preparation. The ſtalks were put into water, and kept covered with it during the winter. In March, they were taken out, dried in a ſtove, and dreſſed as flax. The prepared filaments weighed nearly a pound, and proved fine, ſoft, and white; they were ſpun and wove into ſix ells of fine ſtrong cloth. Unleſs the ſtalks are fully rotted, which will take much longer time than flax, the woody part will not ſeparate, and the cloth will prove neither white nor fine.

PHOSPHATE is a ſaline body compoſed of phoſphoric acid united to ſome baſe, as for inſtance, lime, which is called phoſphate of lime. For an account of the different phoſphates, ſee CHEMISTRY and MINERALOGY *Index*.

PHOSPHORUS, a name given to certain ſubſtances which ſhine in the dark without emitting heat. By this circumſtance they are diſtinguiſhed from the *pyrophori*, which though they take fire on being expoſed to the air, are yet entirely deſtitute of light before this expoſure.

Phoſphori are divided into ſeveral kinds, known by the names of *Bolognian phoſphorus*, *Mr Canton's phoſphorus*, *Baldwin's phoſphorus*, *phoſphorus of urine*, &c. of which the laſt is by far the moſt remarkable both with reſpect to the quantity of light which it emits, and its property of taking fire and burning very fiercely upon being ſlightly heated or rubbed. For the method of preparing theſe, and for an account of their properties and combinations, ſee CHEMISTRY *Index*.

PHOTINIANS, in eccleſiaſtical hiſtory, were a ſect of heretics in the fourth century who denied the divinity of our Lord. They derive their name from *Photinus* their founder, who was biſhop of Sirmium, and a diſciple of Marcellus. Photinus publiſhed in the year 343 his notions reſpecting the Deity, which were repugnant both to the orthodox and Arian ſyſtems. He aſſerted, that Jeſus Chriſt was born of the Holy Ghoſt and the Virgin Mary; that a certain divine emanation, which he called the *Word*, deſcended upon Him; and that becauſe of the union of the divine word with his human nature, He was called the ſon of God and even God himſelf; and that the Holy Ghoſt was not a perſon, but merely a celeſtial virtue proceeding from the Deity. Both parties condemned the biſhop in the councils of Antioch and Milan, held in the years 345 and 347. He was condemned alſo by the council at Sirmium in 351, and was afterwards degraded from the epiſcopal dignity, and at laſt died in exile in the year 372 or 375. His opinions were afterwards revived by Socinus.

PHOTIUS, patriarch of Conſtantinople, was one of the fineſt geniuſes of his time, and his merit raiſed him to the patriarchate; for Bardas having driven Ignatius from the ſee, Photius was conſecrated by Aſbeſtus in 859. He condemned Ignatius in a ſynod, whereupon the pope excommunicated him, and he, to balance the account, anathematized the pope. Baſilius of Macedon, the emperor whom Photius had reproved for the murder of Michael the late emperor, expelled him, and reſtored Ignatius; but afterwards re-eſtabliſhed Photius, upon Ignatius's death, in 878. At laſt, being wrongfully accuſed of a conſpiracy againſt the perſon of Leo the philoſopher, ſon and ſucceſſor to Baſilius, he was expelled by him in 886, and is ſuppoſed to have died ſoon after. He wrote a *Bibliotheca*, which contains an examen of 280 authors: we have alſo 253 epiſtles of his; the *Nomacanon* under 14 titles; an abridgement of the acts of ſeveral councils, &c. This great man was born in Conſtantinople, and was deſcended from a very illuſtrious and noble family. His natural abilities were very great, and he cultivated them with the greateſt aſſiduity.

ſidaity. There was no branch of literature, whether ſacred and profane, and ſcarcely any art or ſcience, in which he was not deeply verſed. Indeed he appears to have been by far the greateſt man of the age in which he lived; and was ſo intimately concerned in the chief tranſactions of it, that eccleſiaſtical writers have on that account called it *Seculum Photianum*. He was firſt raiſed to the chief dignities of the empire, being made principal ſecretary of ſtate, captain of the guards, and a ſenator. In all theſe ſtations he acquitted himſelf with a diſtinction ſuitable to his great abilities; for he was a refined ſtateſman, as well as a profound ſcholar. His riſe to the patriarchate was very quick; for when he was choſen to that office he was only a layman: but that he might be as it were gradually raiſed to that dignity, he was made monk the firſt day, reader the next, and the following days ſubdeacon, deacon, and prieſt. So that in the ſpace of ſix days he attained to the higheſt office in the church. On the whole, however, his ardent love of glory and unbounded ambition made him commit exceſſes which rendered him a ſcourge to thoſe about him.

Fabricius calls his *Bibliotheca* or library, *non liber, ſed inſignis theſaurus*, "not a book, but an illuſtrious treaſure," in which are contained many curious things, relating to authors, and many fragments of works which are no where elſe to be found. It was brought to light by Andreas Schottus, and communicated by him to David Hoeſchelius, who cauſed it to be printed in 1601. Schottus, conſidering the great utility of this work, tranſlated it into Latin, and printed his tranſlation alone in 1606. The Greek text, together with the tranſlation, was afterwards printed at Geneva in 1611.

PHOTOMETER, an inſtrument for aſcertaining the intenſity of light. See OPTICS *Index*.

PHRAATES, or PHRAHATES. There were four kings of this name in Parthia. See PARTHIA.

PHRASE, in *Grammar*, an elegant turn or manner of ſpeech, peculiarly belonging to this or that occaſion, this or that art, or this or that language. Thus we ſay, an Italian *phraſe*, an eaſtern *phraſe*, a poetical *phraſe*, a rhetorical *phraſe*.

PHRASE is ſometimes alſo uſed for a ſhort ſentence or ſmall ſet or circuit of words conſtructed together. In this ſenſe, Father Buffier divides phraſes into complete and incomplete.

Phraſes are *complete* where there is a noun and a verb, each in its proper function; *i. e.* where the noun expreſſes a ſubject, and the verb the thing affirmed of it.

Incomplete phraſes are thoſe where the noun and the verb together only do the office of a noun; conſiſting of ſeveral words without affirming any thing, and which might be expreſſed in a ſingle word. Thus, *that which is true*, is an incomplete phraſe, which might be expreſſed in one word, *truth*; as, *that which is true ſatisfies the mind*, i. e. *truth ſatisfies the mind*.

PHRASEOLOGY, a collection of the phraſes or elegant expreſſions in any language. See PHRASE.

PHREATIS, or PHREATTIUM, in Grecian antiquity, was a court belonging to the civil government of Athens, ſituated upon the ſea-ſhore, in the Piræus. The name is derived from απο τυ φρεατος, becauſe it ſtood in a pit; or, as others ſuppoſe, from the hero *Phreatus*. This court heard ſuch cauſes as concerned perſons who had fled out of their own country for murder, or thoſe that fled for involuntary murder, and who had afterwards committed a deliberate and wilful murder. The laſt who was tried in this place was Teucer, on a groundleſs ſuſpicion that he had been acceſſary to the death of Ajax. The accuſed was not allowed to come to land, or ſo much as to caſt anchor, but pleaded his cauſe in his boat; and if found guilty, was committed to the mercy of the winds and waves, or, as ſome ſay, ſuffered there condign puniſhment; if innocent, he was only cleared of the ſecond fact, and, according to cuſtom, underwent a twelvemonth's baniſhment for the former. See Potter's *Gr. Antiq.* vol. i. p. 111.

PHRENETIC, a term uſed to denote thoſe who, without being abſolutely mad, are ſubject to ſuch ſtrong ſallies of imagination as in ſome meaſure pervert their judgement, and cauſe them to act in a way different from the more rational part of mankind.

PHRENITIS, the ſame with PHRENSY; an inflammation of the meninges of the brain, attended with an acute fever and delirium. See MEDICINE, N° 175; alſo an account of a ſtrange degree of phrenzy which attacked Charles VI. of France, in the article FRANCE, N° 88, &c.

PHRYGANEA, a genus of inſects, belonging to the order neuroptera. See ENTOMOLOGY *Index*.

PHRYGIA, a country in Aſia. From whence it derived its name is not certain: ſome ſay it was from the river Phryx (now Sarabat), which divides Phrygia from Caria, and empties itſelf into the Hermus; others from Phrygia, the daughter of Aſopus and Europa. The Greek writers tell us, that the country took its name from the inhabitants, and theſe from the town of Brygium in Macedonia, from whence they firſt paſſed into Aſia, and gave the name of *Phrygia* or *Brygia* to the country where they ſettled. Bochart is of opinion that this tract was called Phrygia from the Greek verb φρυγειν "to burn or parch;" which, according to him, is a tranſlation of its Hebrew name, derived from a verb of the ſame ſignification.

Ancient Univerſal Hiſtory, vol. iii. p. 441. &c.

No leſs various are the opinions of authors as to the exact boundaries of this country; an uncertainty which gave riſe to an obſervation made by Strabo, viz. that the Phrygians and Myſians had diſtinct boundaries; but that it was ſcarce poſſible to aſcertain them. The ſame writer adds, that the Trojans, Myſians, and Lydians, are, by the poets, all blended under the common name of Phrygians, which Claudian extends to the Piſidians, Bithynians, and Ionians. Phrygia Proper, according to Ptolemy, whom we chooſe to follow, was bounded on the north by Pontus and Bithynia; on the weſt by Myſia, Troas, the Ægean ſea, Lydia, Mæonia, and Caria; on the ſouth by Lycia; on the eaſt by Pamphylia and Galatia. It lies between the 37th and 41ſt degrees of north latitude, extending in longitude from 56 to 62 degrees. The inhabitants of this country, mentioned by Ptolemy, are the Lycaones and Anthemiſenii, towards Lycia; and Moccadelis or Moccadine, the Cyddeſes or Cydiſſi towards Bithynia; and between theſe the Peltini or Speltini, the Moxiani, Phylacenſes, and Hierapolitæ. To theſe we may add the Berecyntes mentioned by Strabo.

Phrygia is commonly divided into the Greater and Leſſer Phrygia, called alſo Troas. But this diviſion did not take place till Troas was ſubdued by the Phrygians; and hence it is mentioned by ſome Roman writers as a part of Phrygia, with Bithynia, Cappadocia, Phrygia.

cia, or any other of the adjacent provinces. In after ages, the Greater Phrygia was divided into two diſtricts or governments; one called Phrygia Pacatiana, from Pacatianus, who, under Conſtantine, bore the great office of the præfectus prætorio of the Eaſt; the other Phrygia Salutaris, from ſome miraculous cures ſuppoſed to have been performed there by the archangel Michael.

This country, and indeed all Aſia Minor, as lying in the fifth and ſixth northern climates, was in ancient times greatly celebrated for its fertility. It abounded in all ſorts of grain; being, for the moſt part, a plain country covered with a deep rich ſoil, and plentifully watered by ſmall rivers. It was in ſome parts productive of bitumen and other combuſtible ſubſtances. It was well ſtocked with cattle, having large plains and paſture grounds. The air was anciently deemed moſt pure and wholeſome, though it is now in ſome parts thought extremely groſs, great part of the country lying uncultivated.

In Phrygia Major were anciently ſeveral cities of great celebrity; ſuch as APANEA, LAODICEA, HIERAPOLIS, Gordium, &c.—There were alſo ſome famous rivers; ſuch as Marſyas, Mæander, &c. The Mæander is now called *Madre* or *Mindre*, and was much celebrated by the ancients for its windings and turnings; from whence all ſuch windings and turnings have been denominated *meanders*.

The Phrygians accounted themſelves the moſt ancient people in the world. Their origin, however, is extremely dark and uncertain. Joſephus and St Jerome ſay, they were deſcended from Togarmah, one of Gomer's ſons; and that they were known to the Hebrews under the name of Tigrammanes. The Heathen authors derive them from the Brygians, a people of Macedonia. But this is but mere conjecture; and it is a conjecture totally unſupported, except by the ſimilarity of names. Bochart thinks that the Phrygians were the offspring of Gomer the eldeſt ſon of Japhet; the word Phrygia being the Greek tranſlation of his name. Joſephus makes Gomer the father of the Galatians; but he, by the Galatians, muſt neceſſarily mean the Phrygians inhabiting that part of Phrygia which the Galatians had made themſelves maſters of; the deſcendants of Gomer being placed by Ezekiel northward of Judæa, near Togarmah (which Bochart takes to be Cappadocia), long before the Gauls paſſed over into Aſia. We are willing to let Gomer enjoy the fine country which Bochart is pleaſed to give him, and allow him the honour of being the progenitor of the Phrygians, ſince we know no other perſon on whom it can be conferred with any degree of probability.

The ancient Phrygians are deſcribed as ſuperſtitious, voluptuous, and effeminate, without any prudence or foreſight, and of ſuch a ſervile temper, that nothing but ſtripes and ill uſage could make them comply with their duty; which gave riſe to ſeveral trite and well known proverbs (A). They are ſaid to have been the firſt inventors of divination by the ſinging, flying, and feeding of birds. Their muſic, commonly called the *Phrygian mood*, is alleged by ſome as an argument of their effeminacy.

This government was certainly monarchical; for all Phrygia was, during the reigns of ſome kings, ſubject to one prince. Ninnacus, Midas, Manis, Gordius, and his deſcendants, were undoubtedly ſovereigns of all Phrygia. But ſome time before the Trojan war, we find this country divided into ſeveral petty kingdoms, and read of divers princes reigning at the ſame time. Apollodorus mentions a king of Phrygia contemporary with Ilus king of Troy. Cedrenus and others ſpeak of one Teuthrans, king of a ſmall country in Phrygia, whoſe territories were ravaged by Ajax, himſelf ſlain in ſingle combat, his royal ſeat laid in aſhes, and his daughter, by name Tecmeſſa, carried away captive by the conqueror. Homer makes mention of Phoreys and Aſcanius, both princes and leaders of the Phrygian auxiliaries that came to the relief of Troy. Tantalus was king of Sipylus only, and its diſtrict; a prince no leſs famous for his great wealth, than infamous for his covetouſneſs and other deteſtable vices. That Phrygia was ſubdued either by Ninus, as Diodorus Siculus informs us, or by the Amazons, as we read in Suidas, is not ſufficiently warranted. Moſt authors that ſpeak of Gordius tell us, that the Phrygians having ſent to conſult an oracle in order to know how they might put an end to the inteſtine broils which rent their country into many factions and parties, received for anſwer, that the moſt effectual means to deliver themſelves and their country from the calamities they groaned under, was to commit the government to a king. This advice they followed accordingly, and placed Gordius on the throne.

Apamea was the chief emporium of all Aſia Minor.—Thither reſorted merchants and traders from all parts of Greece, Italy, and the neighbouring iſlands. Beſides, we know from Syncellus, that the Phrygians were for ſome time maſters of the ſea; and none but trading nations ever prevailed on that element. The country produced many choice and uſeful commodities, which afforded conſiderable exports. They had a ſafe coaſt, convenient harbours, and whatever may incline us to think that they carried on a conſiderable trade. But as moſt of the Phrygian records are loſt, we will not dwell on conjectures ſo difficult to be aſcertained.

We have no ſet form of their laws; and as to their learning, ſince we are told that for ſome time they enjoyed the ſovereignty of the ſea, we may at leaſt allow them a competent ſkill in geography, geometry, and aſtronomy; and add to theſe, from what we have ſaid above, a more than ordinary knowledge of muſic.

Some have been of opinion that the Phrygian language bore a great reſemblance to the Greek; but the

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(A) "Phryges ſero ſapiunt, Phryx verberatus melior, Phryx non minus quam Spyntharus, &c.:" which proverbs intimate their ſervile temper; and ſhow that they were more fit to bewail misfortunes in an unmanly manner, than to prevent them by proper meaſures. Their muſic, too, was ſuited to their effeminate temper. The Doric mood was a kind of grave and ſolid muſic; the Lydian a doleful and lamentable harmony; but the Phrygian chiefly calculated to effeminate and enervate the mind. But this character is contradicted by others.

the contrary is manifeſt from the few Phrygian words which have been tranſmitted to us, and carefully collected by Bochart and Rudbeckius. To theſe we may add the authority of Strabo, who, after attempting to derive the name of a Phrygian city from the Greek, concludes, that it is a difficult matter to diſcover any ſimilitude between the barbarous words of the Phrygian language and the Greek. The Phrygian tongue, after the experiment made by Pſammetichus king of Egypt, was looked upon by the Egyptians as the moſt ancient language of the world. But other nations, particularly the Scythians, refuſed to ſubmit to their opinion, as founded on an argument of no real weight. "As the two children (ſay they) had never heard the voice of any human creature, the word *bec*, or *bekkos*, the firſt they uttered, was only an imitation of the goats that had ſuckled them, and happened to be a Phrygian word ſignifying *bread* (B)."

We have already ſaid, that the Phrygians were ſuperſtitious; their idols were conſequently very numerous. The chief of theſe was Cybele, who went by a variety of names. (See CYBELE). They alſo worſhipped Bacchus under the name of *Sabazios;* and his prieſts they called *Saboi.*

The hiſtory of their kings is dark and uncertain, and the dates of their ſeveral reigns and actions cannot now be fixed; we ſhall refer ſuch of our readers, therefore, as wiſh to know what is certain reſpecting them, to the Ancient Univerſal Hiſtory, already quoted more than once in the preſent article. See alſo GORDIUS, MIDAS, &c. For Phrygia Minor, ſee TROY.

PHRYGIAN STONE, in *Natural Hiſtory*, is the name of a ſtone deſcribed by the ancients, and uſed by them in dyeing; perhaps from ſome vitriolic or aluminous ſalt contained in it, which ſerved to enliven or fix the colours uſed by the dyers. It was light and ſpungy, reſembling a pumice; and the whiteſt and lighteſt were reckoned the beſt. Pliny gives an account of the method of preparing it for the purpoſe of dyeing, which was by moiſtening it with urine, and then heating it red hot, and ſuffering it to cool.—This calcination was repeated three times, and the ſtone was then fit for uſe. Dioſcorides recommends it in medicine after burning; he ſays it was drying and aſtringent.

PHRYGIANS, a Chriſtian ſect. See CATAPHRYGIANS and MONTANISTS.

PHRYNE, was a famous proſtitute, who flouriſhed at Athens about 328 years before the Chriſtian era. She was miſtreſs of Praxiteles, who drew her picture, which was one of his beſt pieces, and was placed in the temple of Apollo at Delphi. We are told that Apelles painted his Venus Anadyomene after he had ſeen Phryne on the ſea-ſhore naked, and with diſhevelled hair. Phryne became ſo very rich by the liberality of her lovers, that ſhe offered to rebuild Thebes at her own expence, which Alexander had deſtroyed, provided this inſcription was placed on the walls: *Alexander diruit, ſed meretrix Phryne refecit;* which was refuted. See *Plin.* 34. c. 8.——There was another of the ſame name who was accuſed of impiety. When ſhe found that ſhe was going to be condemned, ſhe unveiled her boſom, which ſo influenced her judges, that ſhe was immediately acquitted.

PHRYNICUS, a general of Samos, who endeavoured to betray his country, &c.——A flatterer at Athens.——A tragic poet of Athens, diſciple to Theſpis. He was the firſt who introduced a female character on the ſtage.

PHRYNIS was a muſician of Mitylene. He was the firſt who obtained a muſical prize at the Panathenæa at Athens. He added two ſtrings to the lyre, which had always been uſed with ſeven by all his predeceſſors. He flouriſhed about 438 years before the Chriſtian era. We are told that he was originally a cook at the houſe of Hiero king of Sicily.——There was another of the ſame name, a writer in the reign of Commodus, who made a collection, in 30 books, of phraſes and ſentences from the beſt Greek authors, &c.

PHRYXUS, in fabulous hiſtory, was a ſon of Athamas king of Thebes, by Nephele. When his mother was repudiated, he was perſecuted with the moſt inveterate fury by his ſtep-mother Ino, becauſe he was to ſit on the throne of Athamas, in preference to the children of a ſecond wife. His mother apprized him of Ino's intentions upon his life; or, according to others, his preceptor; and the better to make his eſcape, he ſecured part of his father's treaſures, and privately left Bœotia with his ſiſter Helle, to go to their friend and relation Æetes king of Colchis. They embarked on board a ſhip, or, as we are informed by the fabulous account of the poets and mythologiſts, they mounted on the back of a ram, whoſe fleece was of gold; and proceeded on their journey through the air. The height to which they were carried made Helle giddy, and ſhe fell into the ſea. Phryxus gave his ſiſter a decent burial on the ſea-ſhore, and after he had called the place *Helleſpont* from her name, he continued his flight, and arrived ſafe in the kingdom of Æetes, where he offered the ram on the altars of Mars. The king received him with great tenderneſs, and gave him Chalciope his daughter in marriage. She had by him Phrontis Melas, Argos Cylindrus, whom ſome call *Cyprus.* He was afterwards murdered by his father-in-law, who envied him the poſſeſſion of the golden fleece; and Chalciope, to prevent her children from ſharing their father's fate, ſent them privately from Colchis to Bœotia, as nothing was to be dreaded there from the jealouſy or reſentment of Ino, who was then dead. The fable of the flight of Phryxus to Colchis on a ram has been explained by ſome, who obſerve, that the ſhip on which he embarked was either called by that name, or carried on her prow a figure of that animal. The fleece of gold is accounted for, by obſerving that Phryxus carried away immenſe treaſures from Thebes. Phryxus was placed among the conſtellations of heaven after death. The ram which carried him to Aſia is ſaid to have been the fruit of Neptune's amour with Theophane the daughter of Altis. This ram the gods had given to Athamas in order to reward his piety and religious life; and Nephele procured it for her

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(B) Goropius Becanus makes uſe of the ſame argument, to prove that the High Dutch is the original or mother tongue of the world, becauſe the word *beker* in that language ſignifies "a baker."

her children, juſt as they were going to be ſacrificed to the jealouſy of Ino. Phryxus's murder was ſome time after amply revenged by the Greeks; it having occaſioned the famous expedition atchieved under Jaſon and many of the princes of Greece, which had for its object the recovery of the golden fleece, and the puniſhment of the king of Colchis for his cruelty to the ſon of Athamas.

PHTHIRIASIS, the Lousy Evil, from φθειρ, "a louſe." Children are frequently its ſubjects, but adults are ſometimes troubled with it. The increaſe of lice, when in a warm moiſt ſituation, is very great; but a cold and dry one ſoon deſtroys them. On the human body four kinds of lice are diſtinguiſhed: 1. The *pediculi*, ſo called becauſe they are more troubleſome with their feet than by their bite. Theſe are in the heads of children, eſpecially if ſore or ſcabby; and often in thoſe of adults, if they are ſlothful and naſty. 2. Crab-lice. 3. Body lice; theſe infeſt the body, and breed in the clothes of the naſty and ſlothful. 4. A ſort which breed under the cuticle, and are found in the hands and feet: they are of a round form, and ſo minute as often to eſcape the ſight: by creeping under the ſcarf-ſkin they cauſe an intolerable itching; and when the ſkin burſts where they lodge, cluſters of them are found there. See Acarus.

A good diet and cleanlineſs conduce much to the deſtruction of lice. When they are in the head, comb it every day; and, after each combing, ſprinkle the pulv. ſem. ſtaph. agr. or coccul. Ind. among the hairs every night, and confine it with a tight cap.

Codrochius, in his treatiſe on lice, ſays, that the powdered coc. Ind. exceeds all other means; and that it may be mixed in the pulp of apple, or in lard, and applied every night to the hair. Some writers aſſert, that if the pulv. cort. rad. ſaſſafr. be ſprinkled on the head, and confined with a handkerchief, it deſtroys the lice in one night.

The body-lice are deſtroyed by any bitter, ſour, ſalt, or mercurial medicine, if applied to the ſkin.

Black ſoap, and the flowers called *cardamine* or *lady's ſmock*, are ſaid to be ſpecifics in all caſes of lice on the human body.

PHTHISIS, a ſpecies of conſumption, occaſioned by an ulcer in the lungs. See Medicine *Index*.

PHUL, or Pul, king of Aſſyria, is by ſome hiſtorians ſaid to be Ninus under another name, and the firſt founder of that monarchy: A renowned warrior. He invaded Iſrael in the reign of Menahem, who became tributary to him, and paid him 1000 talents of ſilver for a peace. Flouriſhed 771 B. C.

PHUT, or Phuth, the third ſon of Ham (Gen. x. 6.). Calmet is of opinion, that Phut peopled either the canton of Phtemphu, Phtemphuti, or Phtembuti, ſet down in Pliny and Ptolemy, whoſe capital was Thara in Lower Egypt, inclining towards Libya; or the canton called Phtenotes, of which Buthus was the capital. The prophets often ſpeak of Phut. In the time of Jeremiah, Phut was under the obedience of Necho king of Egypt. Nahum (iii. 9.) reckons up his people in the number of thoſe who ought to have come to the aſſiſtance of No-ammon or Dioſpolis.

PHYLACTERY, in the general, was a name given by the ancients to all kinds of charms, ſpells, or characters, which they wore about them, as amulets, to preſerve them from dangers or diſeaſes.

Phylactery particularly denoted a ſlip of parchment, wherein was written ſome text of Holy Scripture, particularly of the decalogue, which the more devout people among the Jews wore on the forehead, the breaſt, or the neck, as a mark of their religion.

The primitive Chriſtians alſo gave the name *phylacteries* to the caſes wherein they incloſed the relicks of their dead.

Phylacteries are often mentioned in the New Teſtament, and appear to have been very common among the Phariſees in our Lord's time.

PHYLICA, Bastard Alaternus; a genus of plants belonging to the pentandria claſs. See Botany *Index*.

PHYLLANTHUS, Sea-side Laurel; a genus of plants belonging to the monœcia claſs. See Botany *Index*.

PHYLLIS, in fabulous hiſtory, was a daughter of Sithon, or, according to others, of Lycurgus king of Thrace, who received Demophoon the ſon of Theſeus; who, at his return from the Trojan war, had ſtopped on her coaſts. She became enamoured of him, and did not find him inſenſible to her paſſion. After ſome months of mutual tenderneſs and affection, Demophoon ſet ſail for Athens, where his domeſtic affairs recalled him. He promiſed faithfully to return as ſoon as a month was expired; but either his diſlike for Phyllis, or the irreparable ſituation of his affairs, obliged him to violate his engagement: and the queen, grown deſperate on account of his abſence, hanged herſelf, or, according to others, threw herſelf down a precipice into the ſea and periſhed. Her friends raiſed a tomb over her body, where there grew up certain trees, whoſe leaves, at a particular ſeaſon of the year, ſuddenly became wet as if ſhedding tears for the death of Phyllis. According to an old tradition mentioned by Servius, Virgil's commentator, Phyllis was changed by the gods into an almond tree, which is called *phylla* by the Greeks. Some days after this metamorphoſis, Demophoon reviſited Thrace; and when he heard of the fate of Phyllis, he ran and claſped the tree, which, though at that time ſtripped of its leaves, ſuddenly ſhot forth, and bloſſomed as if ſtill ſenſible of tenderneſs and love. The abſence of Demophoon from the houſe of Phyllis has given riſe to a beautiful epiſtle of Ovid, ſuppoſed to have been written by the Thracian queen about the fourth month after her lover's departure.—A country woman introduced in Virgil's eclogues.—The nurſe of the emperor Domitian.—A country of Thrace near Mount Pangæus.

PHYSALIS, the Winter Cherry; a genus of plants belonging to the pentandria claſs. See Botany *Index*.

PHYSETER, or Spermaceti Whale, a genus belonging to the order of cete. See Cetology *Index*.

PHYSIC, or Physick, the art of healing; properly called Medicine. The word is formed from the Greek φυσις, "nature;" in regard medicine conſiſts principally in the obſervation of nature. See Physics and Medicine.

PHYSICAL, ſomething belonging to, or really

exiſting

Phyſician.

exiſting in, nature. In this ſenſe we ſay a phyſical point, in oppoſition to a mathematical one, which only exiſts in the imagination; a phyſical ſubſtance or body, in oppoſition to ſpirit, or metaphyſical ſubſtance, &c.

PHYSICIAN, a perſon who profeſſes medicine, or the art of healing diſeaſes. See MEDICINE.

PHYSICIANS, College of, in London, Edinburgh, and Dublin. See *COLLEGE of Phyſicians.*

Phyſicians, [illegible]

PHYSICO-MATHEMATICS, includes thoſe branches of phyſics which, uniting obſervation and experiment to mathematical calculation, undertake to explain the phenomena of nature.

PHYSICS,

1 General definition of phyſics.

TAKEN in its moſt enlarged ſenſe, comprehends the whole ſtudy of nature; and NATURAL PHILOSOPHY is a term of the ſame extent: but ordinary language, and eſpecially in this country, employs both of theſe terms in a much narrower ſenſe, which it is proper in this place to determine with ſome preciſion.

2 A more particular explanation of the term

Under the article PHILOSOPHY, we gave a particular account of that view of nature in which the objects of our attention are conſidered as connected by cauſation; and we were at ſome pains to point out the manner in which this ſtudy may be ſucceſsfully cultivated. By a judicious employment of the means pointed out in that article, we diſcover that the objects of our contemplation compoſe an UNIVERSE, which conſiſts, not of a number of independent exiſtences ſolitary and detached from each other, but of a number of ſubſtances connected by a variety of relations and dependencies, ſo as to form a whole which may with great propriety be called the SYSTEM OF NATURE.

This aſſembling of the individual objects which compoſe the univerſe into one ſyſtem is by no means the work of a haſty and warm fancy, but is the reſult of ſober contemplation. The natural hiſtorian attempts in vain to deſcribe objects, by only informing us of their ſhape, colour, and other ſenſible qualities. He finds himſelf obliged, in deſcribing a piece of marble, for inſtance, to tell us that it takes a fine poliſh; that it ſtrikes fire with ſteel; that it burns to quicklime, that it diſſolves in aquafortis, and is precipitated by alkalies; that with vitriolic acid it makes gypſum, &c. &c. &c. and thus it appears that even the *deſcription* of any thing, with the view of aſcertaining its ſpecific nature, and with the ſole purpoſe of diſcrimination, cannot be accompliſhed without taking notice of its various relations to other things. But what do we mean by the *nature* of any thing? We are ignorant of its eſſence, or what makes it that thing and no other thing. We muſt content ourſelves with the diſcovery of its *qualities* or *properties*; and it is the aſſemblage of theſe which we call its *nature*. But this is very inaccurate. Theſe do not conſtitute its eſſence, but are the conſequences of it. Yet this is all we ſhall ever know of its nature. Now the term *property* is nothing but a name expreſſing ſome relation which the ſubſtance under conſideration has to other things. This is true of all ſuch terms. Gravity, elaſticity, ſenſibility, gratitude, and the like, expreſs nothing but certain *matters of fact*, which may be obſerved reſpecting the object of our contemplation in different circumſtances of ſituation with regard to other things. Our diſtinct notions of individuals, therefore, imply their relations to other things.

The ſlighteſt obſervation of the univerſe ſhows an evident connection between all its parts in their various properties. All things on this earth are connected with each other by the laws of motion and of mind. We are connected with the whole of the ſolar ſyſtem by gravitation. If we extend our obſervations to the fixed ſtars, the connection ſeems to fail; but even here it may be obſerved. Their inconceivable diſtance, it is true, renders it impoſſible for us to obtain any *extenſive* information as to their nature. But theſe bodies are connected with the ſolar ſyſtem by the ſameneſs of the light which they emit with that emitted by our ſun or any ſhining body. It moves with the ſame velocity, it conſiſts (in moſt of them at leaſt) of the ſame colours, and it is reflected, refracted, and inflected, according to the ſame laws.

3 A [illegible]

4 Our attention [illegible] fellow men.

In this unbounded ſcene of contemplation, our attention will be directed to the different claſſes of objects nearly in proportion to the intereſt we take in them. There is nothing in which we are ſo much intereſted as our fellow men; and one of the firſt ſteps that we make in our knowledge of nature, is an acquaintance with them. We learn their *diſtinctive* nature by attending to their *characteriſtic* appearances; that is, by obſerving their actions. We obſerve them continually producing, like ourſelves, certain changes in the ſituation or condition of ſurrounding objects; and theſe changes are evidently directed to certain ends *which reſpect themſelves.* Obſerving this ſubſerviency of the effects which they produce to their own accommodation, we conſider this adjuſtment of means to ends as the effect of an INTENTION, as we experience it to be in our own caſe, where we are conſcious of this intention, and of theſe its effects. We therefore interpret thoſe actions of other men, where we obſerve this adjuſtment of means to ends, as marks or ſigns of intention in them ſimilar to our own. And thus a quality, or power, or faculty, is *ſuppoſed* in them *by means of its ſign*, although the quality itſelf is not *immediately* cogniſable by our ſenſes. And as this intention in ourſelves is accompanied by perception of external objects, knowledge of their properties, deſire of good, averſion from evil, volition, and exertion, without all of which we could not or would not perform the actions which we daily perform, we *ſuppoſe* the ſame perception, knowledge, deſire, averſion, volition, and exertion in them.

5 [illegible]

Thus, by the conſtitution of our mind, we conſider the employment of means, by which ends terminating in the agent are gained, as the natural ſigns of deſign or intention. ART, therefore, or the employment of means, is the natural ſign of intention; and wherever we obſerve this adjuſtment of means to ends, we infer the agency of deſign.

A ſmall acquaintance with the objects around us, obliges us to extend this inference to a great number of beings beſides our fellow men, namely, to the whole animal creation: for in all we obſerve the ſame ſubſerviency to the ends of the agent, in the changes which we find them continually producing in the objects around them. Theſe changes are all adjuſted to their own well-being. In all ſuch caſes, therefore, we are forced, by the conſtitution of our own minds, to infer the exiſtence of deſign or intention in theſe beings alſo.

But in numberleſs changes produced by external objects on each other, we obſerve no ſuch fitneſs in the effects, no ſuch ſubſerviency to the well-being of the agent. In ſuch caſes, therefore, we make no ſuch inference of thought or deſign.

6 All objects divided into thinking and unthinking beings.

Thus, then, there is preſented to our obſervation an important diſtinction, by which we arrange all external objects into two claſſes. The firſt reſembles ourſelves, in giving external marks of that thought or intention of which we are conſcious; and we *ſuppoſe* in them the other properties which we diſcover in ourſelves, but cannot *immediately* obſerve in them, viz. thought, perception, memory, foreſight, and all that collection of faculties which we feel in ourſelves, and which conſtitute the animal. The other claſs of objects exhibits no ſuch appearances, and we make no ſuch inference. And thus we divide the whole of external nature into the claſſes of THINKING and UNTHINKING beings.

7 How we come to the knowledge of mind.

Our firſt judgements about theſe claſſes will be very inaccurate; and we will naturally aſcribe the differences, which we do not very well underſtand, to the differences in organical ſtructure, which we clearly obſerve. But when we have knocked down or perhaps ſmothered an animal, we find that it no longer gives the former marks of thought and intention, and that it now reſembles the claſs of unthinking beings: And yet it ſtill retains all that fitneſs of organical ſtructure which it had before; it ſeems only to want the intention and the will. This obliges us to conclude that the diſtinction does not ariſe from a difference in organical ſtructure, but from a diſtinct ſubſtance common to all thinking beings, but ſeparable from their organical frame. To this ſubſtance we aſcribe thought, intention, contrivance, and all that collection of faculties which we feel in ourſelves. To this ſubſtance in ourſelves we refer all ſenſations, pleaſures, pains, remembrances, deſires, purpoſes; and to this aggregate, however imperfectly underſtood, we give the name MIND. Our organical frame, which ſeems to be only the inſtrument of information and operation to the mind, we call *our* body.

8 The nature of mind as underſtood by mankind in rude ages.

As the animating principle is not, like our body, the immediate object of the ſenſes, we naturally conceive it to be a ſubſtance eſſentially different from thoſe which are the objects of our ſenſes. The rudeſt people have ſhown a diſpoſition to form this concluſion. Obſerving that animal life was connected with breathing, it was natural to imagine that breathing was living, and that breath was life. It is a remarkable fact, that in moſt languages the term for expreſſing *breath* is at leaſt one of the terms for expreſſing the ſoul; רוח, *πνευμα*, *ſpiritus*, in the Hebrew, Greek, and Latin, expreſs both; *gheiſt*, or *ghoſt*, in the Teutonic, comes from *gheiſen*, to "breathe or ſigh;" *dūcha* or *dūha*, "the ſoul," in Sclavonic, comes from *duichat*, "to breathe;" ſo in the Gaelic does *anal* come from *anam*; and the ſame relation is found between the two words in the Malay and other eaſtern languages. We believe that moſt perſons can recollect ſome traces of this notion in their early conceptions of things; and many who do not conſider themſelves as uncultivated, believe that the ſoul quits the body *along with the laſt breath*. Among the Tartar nations hanging is conſidered with particular horror, on account of the ungraceful and filthy exit which the ſoul is obliged to make from the body.

9 Their opinions not juſt.

But the obſervation of the ſame appearances of thought and intention in fiſhes and other animals which do not breathe, would ſoon ſhow that this was but a rude conception. Very little refinement indeed is neceſſary to convince us that air or breath cannot be the ſubſtance which thinks, wiſhes, and deſigns; and that the properties of this ſubſtance, whatever it is, muſt be totally different from, and incompatible with, any thing that we know of the immediate objects of our ſenſes.

10 Of the two kinds of ſubſtances in nature, one is the object of reflection alone, the other of the ſenſes.

Hence we are led to conclude that there are two kinds of ſubſtances in nature: One, which is the principle of ſenſation; and therefore *cannot* be the object of our ſenſes, any more than light can be the object of the microſcope. This ſubſtance alone can feel, think, deſire, and propoſe, and is the object of *reflection alone*. The objects of our ſenſes compoſe the other claſs, and therefore can have none of the other properties which are not cognoſcible by the ſenſes. Theſe have all the properties which our ſenſes can diſcover; and we can have no evidence of their having any other, nor indeed any conception of their having them. This claſs is not confined to the unorganized maſſes of matter; for we ſee that the bodies of animals loſe after death that organical form, and are aſſimilated to all the reſt of unthinking beings. It has ariſen from ſuch views as this, that while all nations have agreed to call this claſs of objects by the name BODY, which originally expreſſes our organical frame, ſome nations, farther advanced in cultivation or refinement, have contrived an abſtract term to expreſs this general ſubſtance of which all inanimate beings are compoſed. Such a term we have in the words *materies*, ὑλη.

11 The diſtinction between material and immaterial ſubſtances is very important.

Matter, then, is that ſubſtance which is immediately cognoſcible by our ſenſes. Whatever, therefore, is not thus immediately cognoſcible by our ſenſes is not material, and is expreſſed by a negative term, and called *immaterial*: hence it is that mind is ſaid to be immaterial. It is of importance to keep in mind this diſtinction, merely grammatical. Little more is neceſſary for detecting the ſophiſms of Helvetius, Mirabeau, and other ſages of the Gallic ſchool, who have been anxious to remove the ties of moral and religious obligation by lowering our conceptions of our intellectual nature. It will alſo ſerve to ſhow how haſtily *they* have formed their opinions who have aſcribed to the immediate agency of mind all thoſe relations which are obſerved in the actions of bodies on each other at a diſtance. The connecting principles of ſuch relations *è diſtante* (if there be any ſuch), are not the immediate objects of our ſenſes: they are therefore immaterial. But it does not follow that they are minds. There may be many immaterial ſubſtances which are not minds. We know nothing of any object whatever but by the obſervation of certain appearances, which ſuggeſt to our minds the exiſtence and agency of its qualities or powers. Such phenomena are the natural ſigns of theſe qualities, and it is to thoſe ſigns that we muſt always have recourſe when we wiſh to conceive

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conceive without ambiguity concerning them. What is the characteriſtic phenomenon of mind, or what is the *diſtinguiſhing* quality which brings it into view? It is INTENTION: and it may be aſſerted with the utmoſt confidence, that we have no other mark by which mind is immediately ſuggeſted to us, or that would ever have made us ſuppoſe that there exiſted another mind beſides our own. The *phenomenon* by which this quality is ſuggeſted to us is *art*, or the employment of means to gain ends; and the mark of art is the ſuppoſed conduciveneſs of theſe ends to the well-being of the agent. Where this train is not obſerved, deſign or intention is never thought of; and therefore where intention is not perceived in any immaterial ſubſtance, if any ſuch has ever been obſerved, it is an abuſe of language to call it mind. We do not think that even perception and intelligence entitle us to give the name mind to the ſubſtance in which they are inherent, becauſe it is from marks of intention alone that we infer the exiſtence of mind; and although theſe muſt be accompanied with perception and intelligence, it does not follow that the ſubſtance which can perceive and underſtand muſt alſo deſire and propoſe. However difficult we may find it to ſeparate them, they are evidently ſeparable in imagination. And let not this aſſertion be too haſtily objected to; for the ſeparation *has been made* by perſons moſt eminent for their knowledge and diſcernment. When Leibnitz aſcribed to his MONADES, or what we call the ultimate ATOMS of matter, a perception of their ſituation in the univerſe, and a motion preciſely ſuited to this perception, he was the fartheſt in the world from ſuppoſing them animated or endowed with minds. It is true indeed, that others, who think and call themſelves philoſophers, are much more liberal in their application of this term. A modern author of great metaphyſical eminence ſays, "I call that *mind* which moves, and that *body* which is moved." This claſs of philoſophers aſſert that no motion whatever is begun except by the agency of an animating principle, which (after Ariſtotle) they call *Nature*, and which has in theſe days been exalted to the rank of a god. All this jargon (for it is nothing elſe) has ariſen from the puzzle in which naturaliſts think themſelves involved in attempting to explain the production of motion in a body at a diſtance from that body which is conceived as the cauſe of this motion. After having been reluctantly obliged, by the reaſonings of Newton, to abandon their methods of explaining ſuch phenomena by the impulſes of an intervening fluid, nothing ſeemed left but the aſſertion that theſe motions were produced by minds, as in the caſe of our own exertions. Theſe explanations (if they deſerve the name) cannot be objected to in any other way than as an abuſe of language, and as the introduction of an unmeaning jargon. We have, and can have, no notion of mind different from thoſe of our own minds; and we diſcover the exiſtence of other minds as we diſcover the exiſtence of bodies, by means of phenomena which are characteriſtic of minds, that is, which reſemble thoſe phenomena that follow the exertion of our own mental faculties, that is, by the employment of means to attain ſelfiſh ends; and where ſuch appearances are not obſerved, no exiſtence of a mind is inferred. When we ſee a man fall from the top of a houſe, and daſh out his brains on the pavement, we never aſcribe this motion to his mind. Although the fitneſs of many of the terreſtrial motions for moſt important purpoſes makes us ſuppoſe deſign and contrivance ſomewhere, and therefore a *Supreme Mind*, we no more think of inferring a mind in the earth from the fitneſs of its motions for purpoſes moſt beneficial to its inhabitants, than of inferring a mind in a bit of bread from its fitneſs for nouriſhing our bodies. It is not from the mere motions of animals that their minds are inferred, but from the conduciveneſs of theſe motions to the well-being of the animal.

12
The mind is not that which produces motion, but that which deſires and wills.

The term mind therefore, in the *ordinary language* of all men, is applied to what deſires and wills at the ſame time that it perceives and underſtands. If we call that mind which *produces motion*, we muſt derive our notions of its qualities or attributes from obſerving their effects. We muſt therefore diſcover the general laws by which they act, that is, the general laws obſerved in thoſe motions which we conſider as their effects. Now theſe are the general laws of motion; and in none of theſe can we find the leaſt coincidence with what we are accuſtomed to call the laws of mind. Nay, it has been the total want of ſimilarity which has given riſe to the diſtinction which all men, in all ages and countries, have made between mind and matter. This diſtinction is found in all languages; and it is an unpardonable liberty which men take with language when they uſe a *term of diſtinction*, a ſingle term, to expreſs things of a different ſpecies. What theſe authors have been pleaſed to call *mind*, the whole world beſides have called by another name, FORCE; which, though borrowed from our own exertions, is yet ſufficiently diſtinctive, and never leads us to confound things that are different, except in the language of ſome modern philoſophers, who apply it to the laws of the agency of mind; and, when ſpeaking of the force of motives, &c commit the ſame miſtakes which the followers of Ariſtotle commit in the uſe of the term mind. *Force*, in the language of theſe philoſophers, means what connects the operations of mind; as mind, in the language of Lord Monboddo, is that which connects the operations of body.

13
The principle of motion not diſtinct from matter and mind.

Thoſe are not leſs to blame who conſider this *Nature* of Ariſtotle, this principle of motion, as an exiſtence or ſubſtance different both from matter and from the minds of intelligent creatures. Ariſtotle calls it in ſome places ἀρχη ψυχη. He might with equal propriety, and equal conſiſtency with his other doctrines, have called mind, ἀρχη [illegible], or an ἀρχη [illegible]. Beſides, we have no evidence for the ſeparability of this ἀρχη ψυχη from body as we have for the ſeparability of ſuch minds as our own, the genuine ψυχαι. Nay, his whole doctrines, when maturely conſidered, aſſume their abſolute inſeparability.

14
Elemental minds an abuſe of language.

This doctrine of elemental minds, therefore, as the immediate cauſes of the phenomena of the material world, is an abuſe of language. It is a jargon; and it is a frivolous abuſe, for it offers no explanation whatever. The phenomena are totally unlike the phenomena of ordinary minds, and therefore receive no explanation from them; and ſince our knowledge of theſe *quaſi* minds muſt be derived entirely from the phenomena, it will be preciſely the ſame, although we expreſs it in common language. We ſhall not indeed raiſe the wonder of our hearers, as thoſe do who fill the world with mind which they never ſuſpected to exiſt; but we ſhall not bewilder their imaginations, confound their ideas, and miſlead their judgements.

15
The dreadful conſequences of materialiſm.

We flatter ourſelves that our readers will not think theſe obſervations unſeaſonable or miſplaced. Of all miſtakes that the naturaliſt can fall into, there is none more fatal to his progreſs in knowledge than the confounding things which are eſſentially different; and of all the diſtinctions which can be made among the objects of our contemplation, there is none of equal philoſophical importance with this between mind and matter: And when we conſider the conſequences which naturally follow from this confuſion of ideas, and particularly thoſe which follow from ſinking the mental faculties of man to a level with the operations of mechanics or chemiſtry, conſequences which the experience of the preſent eventful day ſhows to be deſtructive of all that is noble or deſirable in human nature, and of all that is comfortable in this life, and which blaſts every hope of future excellence—we cannot be too anxious to have this capital diſtinction put in the plaineſt point of view, and expreſſed in the moſt familiar characters, "ſo that he who runneth may read." When we ſee the frenzy which the reaſoning pride of man has raiſed in our neighbourhood, and hear the dictates of philoſophy inceſſantly appealed to in defence of whatever our hearts ſhudder at as ſhocking and abominable; and when we ſee a man (A), of great reputation as a naturaliſt, and of profeſſed humanity and political moderation, congratulating his countrymen on the rapid improvement and almoſt perfection of philoſophy; and after giving a ſhort ſketch of the conſtitution of the viſible univerſe, ſumming up all with a table of elective attractions, and that particular combination and mode of cryſtallization which conſtitutes God (*horreſco referens!*)—is it not full time for us to ſtop ſhort, and to aſk our own hearts "whither are you wandering?"—But ſound philoſophy, reaſoning from effects to their cauſes, will here liſten to the words of our ſacred oracles: "By their fruits ye ſhall know them. Do men gather grapes of thorns, or figs of thiſtles?" The abſurd conſequences of the ſceptical philoſophy of Berkeley and Hume have been thought, by men of undoubted diſcernment, ſufficient reaſons for rejecting it without examination. The no leſs abſurd and the ſhocking conſequences of the mechanical philoſophy now in vogue ſhould give us the ſame abhorrence; and ſhould make us abandon its blood-ſtained road, and return to the delightful paths of nature, to ſurvey the works of God, and feaſt our eyes with the diſplays of mind, which offer themſelves on every hand in deſigns of the moſt extenſive influence and the moſt beautiful contrivance. Following the guidance of heavenly wiſdom, we ſhall indeed find, that "all her ways are ways of pleaſantneſs, and all her paths are peace."

16
The extent of philoſophical ſtudy.

Such is the ſcene of our obſervation, the ſubject of philoſophical ſtudy. Its extent is almoſt unbounded, reaching from an atom to God himſelf. It is abſolutely neceſſary for the ſucceſsful cultivation of this immenſe field of knowledge, that it be committed to the care of different cultivators, and that its various portions be treated in different ways: and, accordingly, the various taſtes of men have given this curioſity different directions; and the ſtudy, like all other taſks, has been promoted by this diviſion of labour.

Some philoſophers have attended only to the appearances of fitneſs which are exhibited in every quarter of the univerſe; and by arranging theſe into different claſſes, and interpreting them as indications of thought aad intention, have acquired the knowledge of many claſſes of ſentient and intelligent beings, actuated by propenſities, and directed by reaſon.

17
The nature and uſes of animal inſtincts.

While the contemplation of theſe appearances indicates thought and deſign in any individual of one of theſe claſſes, and brings its propenſities and purpoſes of action, and the ends gained by theſe actions, into view, the contemplation of theſe propenſities, purpoſes, and ends, occaſions an inference of a much more general kind. All theſe intelligent beings give indications of knowledge and of power; but their knowledge bears, in general, no proportion to their power of producing changes in nature, and of attaining important ends; and their power is neither always, nor in the moſt important caſes, the conſequence of their knowledge. Where the effect of their actions is moſt eminently conducive to their important intereſts, the power of attaining theſe valuable ends is generally independent on any attention to the fitneſs of the means, and the exertion is frequently made without even thinking of the important end. The well-being of the individual is ſecured againſt any danger from its ignorance, indolence, or inattention, by an inſtinctive propenſity, which leads it to the performance of the neceſſary action, which is thus made immediately and ultimately deſirable, without any regard to its ultimate and important end. Thus, in our own nature, the ſupport of animal life, and the improvement of the means of ſubſiſtence by a knowledge of the objects which ſurround us, are not entruſted to our apprehenſions of the importance of theſe ends, but are committed to the ſurer guides of hunger and curioſity.

18
There is a connection between the individuals of a claſs of animals different from that of reſemblance.

The ſame obſervers diſcover a connection between the individuals of a claſs, different from that which ariſes from the mere reſemblance of their external appearance, or even of their propenſities and purſuits; the very circumſtances which produced the claſſification. They obſerve, that theſe propenſities are ſuch, that while each individual ſeeks only its own enjoyment, theſe enjoyments are in general ſuch as contribute to the ſupport of the ſpecies and the enjoyment of other individuals. Thus, in the claſſes of animals, and in human nature, the continuance of the race, and the enjoyment of the whole, are not entruſted to the apprehenſion we entertain of the importance of theſe ends, but are produced by the operation of ſexual love and the love of ſociety.

19
There is alſo a link of connection between ſentient beings of different claſſes.

The ſame obſervers find that even the *different* claſſes of ſentient beings are connected together; and while the whole of each claſs aim only at their own enjoyment, they contribute, in ſome way or other, to the well-being of the other claſſes. Even man, the ſelfiſh lord

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(A) M. de la Metherie, editor of the *Journal de Phyſique*. See his prefaces to the volumes for 1792 and 1793, January and July.

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lord of this ſublunary world, is not the unconnected inhabitant of it. He cannot, in every inſtance, reap all the fruits of his ſituation, without contributing to the enjoyment of thouſands of the brute creation. Nay, it may be proved to the ſatisfaction of every intelligent man, that while one race of animals, in conſequence of its peculiar propenſities, ſubſiſts by the deſtruction of another, the ſum total of animal life and enjoyment is prodigiouſly increaſed. See a very judicious diſſertation on this curious and puzzling ſubject, entitled *A Philoſophical Survey of the Animal Creation*; where it appears that the increaſe of animal life and enjoyment which is produced by this means, beyond what could poſſibly obtain without it, is beyond all conception. See likewiſe the laſt edition of *King's Origin of Evil*, by Dr Law late biſhop of Carliſle.

20
The end of this connection is the accumulation of happineſs.

Thus the whole aſſemblage ſeems connected, and jointly employed in increaſing the ſum total of poſſible happineſs. This fitneſs of the various propenſities of ſentient and intelligent beings, this ſubſerviency to a general purpoſe, ſtrikes theſe obſervers as a mark of intention, evidently diſtinct from, and independent of, all the particular intentions, and ſuperior to them all; and thus it irreſiſtibly leads them to infer the exiſtence of a SUPREME MIND, directing the whole of this INTELLECTUAL SYSTEM, while the individuals of which it conſiſts appear the unconſcious inſtruments in the hand of a great Artiſt, with which he executes his grand and beneficent purpoſes.

21
All nature, animate and inanimate, thinking, and unthinking, is connected.

But the obſervation goes yet further. The bodies of the inanimate creation are not only connected with each other by a mutual dependence of properties, and the relation of cauſation, but they are alſo connected with the ſentient beings by a ſubſerviency to their purpoſes of enjoyment. The philoſopher obſerves that this connection is admirably kept up by the conſtancy of natural operations and the expectations of intelligent beings. Had either of theſe circumſtances been wanting, had either the operations of nature been without rule, or had ſentient beings no perception or expectation of their uniformity; the ſubſerviency would be totally at an end. This adjuſtment, this fitneſs, of which the effect is the enjoyment of the ſentient inhabitants of the univerſe, appear to be the effect of an intention of which this enjoyment is the final cauſe. This conſtancy therefore in the operations of nature, both in the intellectual and material world, and the concomitant expectation of ſentient beings, appear the effects of *laws* impoſed on the different parts of the univerſe by the Supreme Mind, who has formed both theſe claſſes of beings ſo admirably ſuited to each other.

22
The origin of natural theology.

To ſuch obſervers the world appears a WORK OF ART, a ſyſtem of means employed for gaining certain propoſed ends, and it carries the thoughts forward to an ARTIST; and we infer a degree of ſkill, power, and good intention in this Artiſt, proportioned to the ingenuity, extent, and happy effect which *we are able to diſcern* in his works. Such a contemplation of nature, therefore, terminates in NATURAL THEOLOGY, or the diſcovery of the exiſtence and attributes of GOD.

23
Our mode of reaſoning on the operations of God.

Our notions of this *Supreme Mind* are formed from the indications of deſign which we obſerve, and which we interpret in the ſame way as in the actions of men. Theſe notions, therefore, will differ from our notions of other minds only in the *degree* which we are able to obſerve, and which we aſſign to theſe attributes; for the phenomenon or the effect is not only the mark, but alſo the meaſure of its ſuppoſed cauſe. Theſe degrees muſt be aſcertained by our own capacity of appreciating the extent, the multiplicity, and the variety of the contrivance. Accordingly, the attributes of the Supreme Mind, in the theological creed of a rude Indian, are much more limited than in that of a European philoſopher. In proportion as our underſtandings are enlarged, and as our acquaintance with the operations of nature around us is extended, we ſhall perceive higher degrees of power, of ſkill, and of kind intention: and ſince we find that the ſcene of obſervation is unbounded, we cannot affix any boundaries to theſe attributes in our own imagination, and we are ready to ſuppoſe that they are infinite or unbounded *in their own nature*. When our attentive ſurvey of *this* univerſe, and a careful compariſon of all its parts, as far as we can underſtand or appreciate them, have made us conclude that it is *one* deſign, the work of *one Artiſt*; we are under the neceſſity of inferring, that, with reſpect to *this univerſe*, his power, wiſdom, and benevolence, are indeed infinite.

24
The ſyſtem of nature is governed by general laws.

When men have been led to draw this concluſion from the appearances of fitneſs which are obſerved everywhere around them, they conſider that conſtancy which they obſerve in natural operations, whether in the material or the intellectual ſyſtem, and that expectation of, and confidence in, this conſtancy, which renders the univerſe a ſource of enjoyment to its ſentient inhabitants, as the conſequences of laws impoſed by the Almighty Artiſt on his works, in the ſame manner as they would conſider the conſtancy in the conduct of any people as the conſequences of laws promulgated and enforced by the ſupreme magiſtrate.

25
The nature and progreſs of the ſtudy of mind.

There can be no doubt of this view of nature being extremely captivating, and likely to engage the curioſity of ſpeculative men; and it is not ſurpriſing that the phenomena of mind have been keenly ſtudied in all ages. This part of the ſtudy of nature, like all others, was firſt cultivated in ſubſerviency to the wants of ſocial life; and the general laws of moral ſentiment were the firſt phenomena which were conſidered with attention. This gradually ripened into a regular ſyſtem of moral duty, accompanied by its congenial ſtudy, the inveſtigation or determination of the *ſummum bonum*, or the conſtituents of human felicity; and theſe two branches of intellectual ſcience were always kept in a ſtate of aſſociation by the philoſophers of antiquity. Juriſprudence, the ſcience of government, legiſlation, and police, were alſo cultivated as arts, or at leaſt in immediate ſubſerviency to the demands of cultivated ſociety; and all theſe ſo nearly related parts of the ſtudy of human nature, had made a very conſiderable progreſs, in the form of maxims or precepts for directing the conduct, before ſpeculative men, out of mere curioſity, treated them as ſubjects of philoſophical ſtudy. Our moral ſentiments, always involving a feeling of obligation, are expreſſed in a language conſiderably different from the uſual language of philoſophy, ſpeaking of things which *ought to be*, rather than of things which *are*; and this diſtinction of language was increaſed by the very aim of the writers.

26
The riſe of moral ſentiment and duty.

which was generally to influence the conduct as well as the opinions of their ſcholars. It was reſerved for modern times to bring this ſtudy into the pure form of philoſophy, by a careful attention to the phenomena of moral ſentiment, and claſſing theſe according to their generality, and aſcertaining their reſpective ranks by an appeal to experiment, that is, to the general conduct of mankind: and thus it happens that in the modern treatiſes on ethics, juriſprudence, &c. there is leſs frequent reference made to the *officia* or duties, or to the conſtituents of the *ſummum bonum*, than among the ancients, and a more accurate deſcription of the human mind, and diſcrimination of its various moral feelings.

27
The origin of logic and other intellectual ſciences.

It was hardly poſſible to proceed far in in theſe diſquiſitions without attending to the powers of the underſtanding. Differences of opinion were ſupported by reaſonings, or attempts to reaſoning. Both ſides could not be in the right, and there muſt be ſome court of appeals. Rules of argumentation behoved to be acquieſced in by both parties; and it could hardly eſcape the notice of ſome curious minds, that there were rules of truth and falſehood as well as of right and wrong. Thus the human *underſtanding* became an object of ſtudy, firſt in ſubſerviency to the demands of the moraliſts, but afterwards for its own ſake; and it gradually grew up into the ſcience of logic. Still further refinement produced the ſcience of metaphyſics, or the philoſophy of univerſals. But all theſe were *in fact* poſterior to the doctrines of morals; and diſquiſitions on beauty, the principles of taſte, the precepts of rhetoric and criticiſm, were the laſt additions to the ſtudy of the phenomena of mind. And now, ſince the world ſeems to have acquieſed in the mode of inveſtigation of general laws by experiment and obſervation, and to agree that this is all the knowledge that we can acquire of any ſubject whatever, it is to be expected that this branch of philoſophical diſcuſſion will attain the ſame degree of improvement (eſtimated by the coincidence of the doctrines with fact and experience) that has been attained by ſome others.

28
The partial practice of natural philoſophy preceded its ſtudy as a ſcience.

The occupations, however, of ordinary life have oftener directed our efforts towards material objects, and engaged our attention on their properties and relations; and as all ſciences have ariſen from arts, and were originally implied in the maxims and precepts of thoſe arts, till ſeparated from them by the curious ſpeculatiſt, the knowledge of the material ſyſtem of nature was poſſeſſed in detached ſcraps by the practitioners in the various arts of life long before the *natural philoſopher* thought of collecting them into a body of ſcientific doctrines. But there have not been wanting in all ages men of curioſity who have been ſtruck by the uniformity of the operations of nature in the material world, and were eager to diſcover their cauſes.

Accordingly, while the moraliſts and metaphyſicians turned their whole attention to the phenomena of mind, and have produced the ſciences of pneumatology, logic, ethics, juriſprudence, and natural theology, theſe obſervers of nature have found ſufficient employment in conſidering the phenomena of the material world.

The bodies of which it conſiſts are evidently connected by means of thoſe properties by which we obſerve that they produce changes in each other's ſituation. This aſſemblage of objects may therefore be juſtly called a ſyſtem. We may call it the MATERIAL SYSTEM. It is frequently termed NATURE; and the terms NATURAL APPEARANCES, NATURAL CAUSES, NATURAL LAWS, have been generally reſtricted to thoſe which take place in the material ſyſtem. This reſtriction, however, is improper, becauſe there is no difference in the manner in which we form our notions of thoſe laws, and reaſon from them, both with reſpect to mind and body. Or if there is to be any reſtriction, and if any part of the ſtudy of the univerſe is to be excluded in the application of theſe terms, it is that part only which conſiders moral obligation, and rather treats of what *ought to be* than of what *is*. As has been already obſerved, there is a conſiderable difference in the language which muſt be employed; but ſtill there is none in the principles of inveſtigation. We have no proof for the extent of any moral law but an appeal to the feelings of the hearts of men, indicated by the general laws or facts which are obſerved in their actions.

29
The nature of the material ſyſtem with the definition of that and other terms.

30
The unreſtricted ſenſe in which ſome of theſe terms are uſed, and its bad conſequences.

But this is only a queſtion of the propriety of language. And no great inconvenience would ariſe from the reſtriction now mentioned if it were ſcrupulouſly adhered to; but unfortunately this is not always the caſe. Some authors uſe the term *natural law* to expreſs *every* coincidence of fact; and this is certainly the proper uſe of the term. The French writers generally uſe the term *loi phyſique* in this enlarged ſenſe. But many authors, miſled by, or taking advantange of, the ambiguity of language, after having eſtabliſhed a law founded on a copious and perhaps unexcepted induction of the phenomena of the material ſyſtem (in which caſe it muſt be conſidered in its reſtricted ſenſe), have, in their explanation of phenomena, extended their principle much farther than the induction on which they had founded the exiſtence of the phyſical law. They have extended it to the phenomena of mind, and have led their followers into great and dangerous miſtakes. Languages, like every other production of human ſkill, are imperfect. They are deficient in terms, and are therefore figurative. The moſt obvious, the moſt frequent, and the moſt intereſting uſes of language, have always produced the appropriated terms, and the progreſs of cultivation has never completely ſupplied new ones. There are certain analogies or reſemblances, or certain aſſociations of ideas, ſo plain, that a term appropriated to one very familiar object will ſerve to ſuggeſt another analogous to it, when aided by the concomitant circumſtances of the diſcourſe; and this with ſufficient preciſion for the ordinary purpoſes of ſocial communication, and without leading us into any conſiderable miſtakes: and it is only the rare and refined diſquiſitions of the curious ſpeculatiſt that bring the poverty and imperfection of language into view, and make us wiſh for words as numerous as our thoughts. There is hardly a ſentence, even of common diſcourſe, in which there are not ſeveral figures either of ſingle words or of phraſes; and when very accurate diſcrimination is required, it is almoſt impoſſible to find words or phraſes to expreſs diſtinctions which we clearly feel. We believe it impoſſible to expreſs, by the ſcanty vocabulary

Introduction. cabulary of the Hebrews, the nice diſtinctions of thought which are now familiar to the European philoſopher. In nothing does this imperfection of language appear ſo remarkably as in what relates to mind. Being a late ſubject of ſeparate diſcuſſion, and intereſting only to a few ſpeculatiſts, we have no appropriated vocabulary for it; and all our diſquiſitions concerning its operations are in continual metaphor or figure, depending on very ſlight analogies or reſemblances to the phenomena of the material world. This makes the utmoſt caution neceſſary; and it juſtifies the Britiſh philoſophers, who have been the moſt ſucceſsful in proſecuting the ſtudy of the intellectual ſyſtem, for having, almoſt without exception, reſtricted the terms natural laws, natural cauſes, natural philoſophy, and ſuch like, to the material ſyſtem. With us pneumatology makes no part of phyſics. And we may venture to affirm, that the ſciences have fared better by the reſtriction of the terms. In no country has the ſpirit of liberal diſcuſſion been more encouraged and indulged than in Britain; and her philoſophers have been equally eminent in both branches of ſcience. Their performances in ethics, juriſprudence, and natural theology, are conſidered by all our neighbours as the fountains of knowledge on theſe ſubjects; and Locke and Clarke are names no leſs familiar on the continent than Newton. The licentious and degrading doctrines of the Gallican ſchool have as yet made little impreſſion here; and man is ſtill conſidered among us as a glorious creature, born to, and fitted for, the nobleſt proſpects.

31 The term *phyſics* defined as it is generally underſtood in Britain. Phyſics, then, is with us the ſtudy of the material ſyſtem, including both natural hiſtory and philoſophy. The term is not indeed very familiar in our language; and in place of *phyſicus* and *diſciplina phyſica*, we more generally uſe the terms *naturaliſt* and *natural knowledge*. The term *natural philoſophy*, in its common acceptation, is of leſs extent. The field of phyſical inveſtigation is ſtill of prodigious extent; and its different quarters require very different treatments, make very different returns, and accordingly have engaged in their particular cultivation perſons of very different talents and taſtes. It is of ſome importance to perceive the diſtinctions, and to ſee how the wants and propenſities of men have led them into the different paths of inveſtigation; for, as has been more than once obſerved, all ſciences have ſprung from the humble arts of life, and both go on improving by means of a cloſe and conſtant correſpondence.

32 The phenomena of the material ſyſtem arranged into two claſſes. All the phenomena of the material ſyſtem may be arranged into two claſſes, diſtinguiſhed both by their objects and by the proper manner of treating them.

The firſt claſs comprehends all the appearances which are exhibited in the *ſenſible motions* of bodies, and their actions on each other producing *ſenſible motion*.

The ſecond claſs comprehends the appearances which are exhibited in the *inſenſible* motions and actions of the inviſible particles of matter.

33 Examples of thoſe of the firſt claſs, Of the phenomena of the firſt claſs we have examples in the planetary motions, the motions of heavy bodies, the phenomena of impulſe, the motions and actions of machines, the preſſure and motions of fluids, the ſenſible actions of magnetical and electrical bodies, and the motions of light.

Introduction. We have examples of the ſecond claſs in the phenomena of heat and mixture, and thoſe exhibited in the growth of animals and vegetables, and many phenomena of ſolid, fluid, magnetical, electrical, and luminous bodies, in which no change of place can be obſerved. 34 and of thoſe of the ſecond.

35 This arrangement [illegible] natural. Thus it appears that there is a diſtinction in the phenomena ſufficiently great to warrant a diviſion of the ſtudy, and to make us expect a more rapid improvement by this diviſion. Nay, the diviſion has been made by nature itſelf, in the acquaintance which men have attained with her operations without ſtudy, before ſcience appeared, and while art conſtituted all our knowledge.

36 Of the progreſs of knowledge in rude ages. Before man had recourſe to agriculture as the moſt certain means of procuring ſubſiſtence, our acquaintance with external ſubſtances was principally that of the natural hiſtorian; conſiſting of a knowledge of their fitneſs for food, medicine, or accommodation, their places of growth or habitation, and the means of procuring them, depending on their manner of life or exiſtence. It required a ſtudied attention to theſe circumſtances to give rise to agriculture, which therefore generally made its appearance after men had been in the practice of keeping flocks; by which means they were more at their eaſe, and had ſome leiſure to attend to the objects around them, and in particular to thoſe circumſtances of ſoil and weather which affected the growth of their paſture. 37 The origin of agriculture, phyſic, ſurgery, and chemiſtry.

When agriculture and a rude medicine were thus eſtabliſhed, they were the firſt *arts* which had their foundation in a *ſyſtem of laws*, by which the operations of nature were obſerved to be regulated; and with theſe arts we may begin the *general ſtudy of nature*, which was thus divided into two different branches.

The rude phyſician would be at firſt a collector of *ſpecifics*; but by degrees he would obſerve reſemblances among the *operations* of his drugs, and would claſs them according to theſe reſemblances. He would thus come to attend leſs to the drug than to its mode of operation; and would naturally ſpeculate concerning the connection between the operation and the economy of animal life. His art now becomes a ſcientific ſyſtem, connected by principle and theory, all proceeding on the obſervation of changes produced by one kind of matter on another, but all out of ſight. The frequent recourſe to the vegetable kingdom for medicines would cauſe him to attend much more minutely to the few plants which he has occaſion to ſtudy than the huſbandman can do to the multitude he is obliged to rear. The phyſician muſt learn to think, the huſbandman to work. An analogy between the economy of animal and vegetable life could hardly fail to engage the attention of the phyſician, and would make him a botaniſt, both as a collector of plants and as a philoſopher.

He would naturally expect to unite the ſervices of his drugs by combining them in his recipes, and would be ſurpriſed at his diſappointments. C[illegible] and unexpected changes would frequently occur in his manipulations: the ſenſible qualities, and even the external appearances of his ſimples, would be often changed, and even inverted by their mixture; and their medicinal properties would frequently vaniſh from the compound, and new ones be induced. [illegible], and to him intereſting facts, and he would naturally be [illegible]

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ter the principles which regulate theſe changes. His ſkill in this would by degrees extend beyond the immediate uſe for the knowledge; and the more curious ſpeculatiſt would lay the foundations of a moſt extenſive and important ſcience, comprehending all the phenomena of heat and mixture.

Along with this, and ſpringing from the ſame ſource, another ſcience muſt ariſe, contemplating the appearances of animal and vegetable life, and founded on a careful obſervation and accurate deſcription of the wonderful machine. The moſt incurious of men have in all ages been affected by the diſplays of wiſdom and contrivance in the bodies of animals, and immediately engaged in inveſtigation into the uſes and functions of their various parts and organs. The phenomena have been gradually diſcriminated and arranged under the various heads of nutrition, concoction, ſecretion, abſorption, aſſimilation, rejection, growth, life, decay, diſeaſe, and death; and, in conformity to the doctrines which have with greater or leſs evidence been eſtabliſhed on theſe ſubjects, the action of medicines, and the whole practice of phyſic and ſurgery, has been eſtabliſhed in the form of a liberal or ſcientific art.

38
The origin of the knowledge of the mechanical powers.

The huſbandman in the mean time muſt labour the ground which lies before him. He, too, is greatly intereſted in the knowledge of the vegetable economy, and forms ſome ſyſtems on the ſubject by which he regulates his labours: but he ſees, that whatever is the nature of vegetable life, he muſt work hard, and he ſearches about for every thing which can tend to diminiſh his labour. The properties of the lever, the wedge, and the inclined plane, ſoon become familiar to him; and without being able to tell on what their efficacy depends, he uſes them with a certain ſagacity and effect. The ſtrength of timber, the preſſure and force of water, are daily ſeen and employed by him and other artiſans who labour for their mutual accommodation; and ſome rude principles on theſe ſubjects are committed to memory. Many tools and ſimple machines are by this time familiar; and thus the *general* properties of matter, and the general laws of the actions of bodies on each other, become gradually matter of obſervation and reflection; and the practical mechanic will be frequently improving his tools and machines. The general aim is to produce a greater quantity of work by the ſame exertion. The attempts to improvement will be aukward, and frequently unſucceſsful. When a man finds, that by increaſing the length of his lever he increaſes his power of overcoming a reſiſtance, a ſmall degree of curioſity is ſufficient to make him inquire in what proportion his advantage increaſes. When he finds that a double length gives him a double energy, he will be ſurpriſed and mortified to find, that at the end of the day he has not performed twice the quantity of work: but, after much experience, he will learn that every increaſe of energy, by means of a machine, is nearly compenſated by an increaſe of time in the performance of his taſk; and thus one of the great and leading principles of practical mechanics was inculcated in a manner not to be forgotten, and the practical mechanic was brought to ſpeculate about motion and force, and by gradual and eaſy ſteps the general laws of ſimple motions were eſtabliſhed.

39
The [illegible] of mathematics.

It is evident that theſe ſpeculations cannot be carried on, nor any conſiderable knowledge acquired, without ſome acquaintance with the art of meaſurement: and the very queſtions which the mechanic wiſhes to ſolve, preſuppoſe ſome advances in this art, which in proceſs of time refined itſelf into mathematics, the moſt perfect of all the ſciences. All the phenomena of ſenſible motion afford employment to the mathematician. It is performed in a double or triple time, through a double or triple ſpace, by a double or triple body, by the exertion of a double or triple force, produces a double or triple effect, is more to the right or to the left, upwards or downwards, &c. In ſhort, every affection of motion is an object of mathematical diſcuſſion. Such a ſcience muſt have appeared ere now in the form of an art, in conſequence of the mutual tranſactions of men. Theſe among an uncultivated people are chiefly in the way of barter. If I want corn from a peaſant, and have nothing to give for it but the cloth which I have made, we muſt fall on ſome way of adjuſting our terms in reſpect of the quantity. We ſhould ſoon diſcover that the length, and breadth, and depth, of the box or bag, were equally important; and it was not difficult to ſee, that if any of them were doubled or tripled, the quantity of grain would be ſo too; if two of them were doubled, the grain would be quadrupled; and if all the three were doubled the quantity of grain would be increaſed eight times: the ſame thing would be obſerved with reſpect to my cloth. By ſuch tranſactions as theſe, a few of the properties of plane and ſolid numbers and figures would become known, and the operations of multiplication and diviſion, where arithmetic is combined with geometry: and daily obſervation ſhows us, that the more abſtruſe properties of number and figure, which to the generality of mankind are ſo inſignificant, lay hold on the fancy of ſome individuals with ſuch force, as to abſtract them from every other intellectual entertainment, and are ſtudied with a keenneſs and perſeverance almoſt unequalled in any other walk of ſcience. To moſt men the performance of a machine is a more attractive object than the properties of a figure, and the property of a figure more entertaining than that of a number; but the fact ſeems to have been otherwiſe. Before Pythagoras had invented the theorem that bears his name (ſee PHILOSOPHY, N° 15. and note H), and which is among the firſt elements of geometry, he had reformed the Grecian muſic by the addition of a note to their ſcale, and this addition proceeds on a very refined ſpeculation on the properties of numbers; ſo that among the Greeks arithmetic muſt have made conſiderable progreſs, while geometry was yet in its cradle: and we know to what aſtoniſhing length they proſecuted the ſcience of pure geometry, while their knowledge of mechanical principles was almoſt nothing. Alſo the Arabs hardly made any addition to the geometry of the Greeks, if they did not rather almoſt completely forget it; whilſt they improved their arithmetic into algebra, the moſt refined and abſtracted branch of human knowledge. There is ſuch a diſtance, in point of ſimplicity, between pure mathematics and the moſt elementary mechanics, that the former continued to make rapid ſteps to improvement in more modern times, while the latter languiſhed in its infancy, and hardly deſerved the name of ſcience till very lately, when the great demand for it, by the increaſe and improvement in manufactures, both intereſted many in the ſtudy, and facilitated its progreſs, by the multitude of machines which were contriving on all hands by the manufacturers and artiſans: and even at preſent it muſt be acknowledged, that it is to them that we are indebted for almoſt every new invention in mechanics, and that the ſpeculatiſt ſeldom has done more than improve the invention, by exhibiting its principles, and thus enabling the artiſt to correct its imperfections; and now ſcience and art go hand in hand, mutually giving and receiving aſſiſtance. The demands of the navigator for mathematical and aſtronomical knowledge have dignified theſe ſciences; and they are no longer the means of elegant amuſement alone, but merit the munificence of princes, who have erected obſervatories, and furniſhed voyages of diſcovery, where the mathematical ſciences are at the ſame time cheriſhed and applied to the moſt important purpoſes.

This ſhort ſketch of what may be called *the natural hiſtory of phyſical ſciences* will not, we hope, be thought improper or unprofitable. It tends to confirm an aſſertion often alluded to, that the proſecution of the ſtudy of nature will be more ſucceſsful, if we imitate her mode of proceeding, and divide the labour. It will be ſtill further confirmed by attending to the ſcientific difference of the phenomena, which marks out a different mode of proceeding, and a difference in the knowledge which we ſhall ultimately acquire, after our moſt ſucceſsful reſearches.

40 The connecting principle of concomitant events is totally unknown.

In both claſſes of phenomena already diſtinguiſhed (N° 6.) we muſt grant, that the principle which connects the pairs of concomitant events, rendering the one the inſeparable companion of the other, is totally unknown to us, becauſe it is not the immediate object of our perception.

41 In the firſt claſs, however, the exertion of this principle may be accurately obſerved,

But in the phenomena of the firſt claſs, we ſee the *immediate* exertion of this principle, whatever it may be; we can obſerve the exertion with accuracy; we can determine its kind and degree, which are the ſigns and meaſures of the kind and degree of the unperceived cauſe. This exertion, being always ſome modification of motion, allows us to call in the aid of mathematical knowledge, and thus to aſcertain with the preciſion peculiar to that ſcience the energy of the cauſe, judging of the tendency and quantity by the tendency and the quantity of the obſerved effect.

42 but not in the ſecond:

But in the ſecond claſs of phenomena the caſe is very different. In the operations of chemiſtry, for inſtance, the *immediate* exertion of the cauſe is not perceived: all that we obſerve is the aſſemblage of particles which obtains before mixture, and that which takes place when it is completed, and which we conſider as its reſult. The procedure of nature in producing the change is unſeen and unknown. The ſteps are hid from our obſervation. We are not only ignorant of the cauſe which determines one particle of our food to become a part of our body while others are rejected, but we do not ſee the operation. We are not only ignorant of the cauſe which determines a particle of vitriolic acid to quit the foſſil alkali with which it is united in Glauber ſalt, and to attach itſelf to a particle of magneſia already united with the muriatic acid, which alſo quits it to unite with the alkali, but we do not ſee the operation. The particles and their motions are not the objects of our ſenſes; and all that we ſee is the Epſom ſalt and common ſalt ſeparated from the water in which we had formerly diſſolved the ſal mirabile and the muriated magneſia. The motions, which are the *immediate* effects of the changing cauſes, and therefore their *only indications, characteriſtics, and meaſures*, fitted to ſhow their nature, are hid from our view.

43 [illegible] derſtood.

Our knowledge therefore of theſe phenomena muſt be leſs perfect than that of the phenomena of the former claſs; and we muſt here content ourſelves with the diſcovery of more remote relations and remote cauſes, and with our ignorance of the very powers of nature by which theſe changes are brought about, and which are cognoſcible only by their immediate effects, viz. the motions which they produce unſeen. The knowledge which we do really acquire is ſomewhat ſimilar to what the mechanical philoſopher has acquired when he has diſcovered, by many experiments and inveſtigations, that magnets attract each other by their diſſimilar poles, and repel each other by their ſimilar poles, and do not act at all on any bodies but loadſtones and iron. Here we leave undiſcovered all that is moſt curious in the phenomenon, viz. how theſe attractions and repulſions are produced; and even here the magnetical philoſopher has the advantage of ſeeing the agents and the operation.

44 Though unſeen, philoſophers have attempted to explain them by the doctrine of motion:

But philoſophers attending to this circumſtance, viz. that, even in theſe caſes, the changes are produced by motions, or conſiſt in motions, however unſeen theſe may be, have concluded, that the laws according to which nature operates in producing theſe changes are ſimilar to the laws which regulate her operations in the ſenſible actions of bodies, or are included in them; and that the motions, though unſeen, and the moving forces, are perfectly ſimilar. They have therefore employed ſimilar modes of inveſtigation, applying the laws of impulſe, and calling in the aid of mathematical knowledge.

Of this we have many examples in the writings of Dr Freind, Keil, Bernouilli, Helſham, Boerhaave, Hartley, and others, who have delivered theories of fermentation, ſolution, precipitation, cryſtallization, nutrition, ſecretion, muſcular action, nay even of ſenſation and intelligence, founded, as they think, on the laws of motion, and illuſtrated and ſupported by mathematical reaſoning. Lord Bacon himſelf, that careful and ſagacious diſtinguiſher of intellectual operations, has gone into the ſame track in his explanation of the phenomena of fire and combuſtion: and Sir Iſaac Newton has made ſeveral attempts of the ſame kind, although with peculiarities which always characteriſe his diſcuſſions, and make them very different from thoſe of an inferior claſs.

45 but their attempts have been unſucceſsful.

But the ſucceſs of theſe philoſophers has hitherto been very diſcouraging: indeed they had no title to expect any; for their whole trains of reaſoning have proceeded on analogies which were not obſerved, but inferred or *ſuppoſed* without any authority. There is not that ſimilarity in the phenomenon, or in the viſible effect, which is abſolutely neceſſary for a legitimate reaſoning by analogy. We do not obſerve any local motion, any change of place, which alone enables us to reaſon mathematically on the ſubject. And to make the caſe deſperate, this ill-founded analogy has been mixed with hypotheſes completely gratuitous. Certain forms have been aſſigned to the particles, and certain modes of action have been laid down for them, for whoſe reality we have not the leaſt argument or indication: and to complete the matter, theſe fancied forms and laws of action have been ſuch as are either not [illegible] or they

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they have been ſuch as, if allowed to act in a way analogous to what we obſerve in the ſenſible motions of bodies, would produce effects totally different from thoſe which are obſerved. Theſe atomical theories, as they are called, tranſgreſs every rule of philoſophical diſcuſſion, and even the beſt of them are little better than trifling amuſements. By far the greateſt part of them only ſerve to raiſe a ſmile of pity and contempt in every perſon at all acquainted with mechanical philoſophy. Whenever we ſee an author attempting to explain theſe hidden operations of nature by inviſible fluids, by ethers, by colliſions, and vibrations, and particularly if we ſee him introducing mathematical reaſonings into ſuch explanations—the beſt thing we can do is to ſhut the book, and take to ſome other ſubject. That we may not be thought to ſpeak preſumptuouſly on this occaſion, we only beg leave to remind our readers, that the united knowledge of the moſt eminent mathematicians of Europe has not yet been able to give any thing more than an approximation to the ſolution of the problem of three bodies; that is, to determine with accuracy the motions of three particles of matter acting on each other in the ſimpleſt of all poſſible manners, viz. by forces varying as the ſquares of the diſtances inverſely: and the vibrations of elaſtic bodies, of any but the very ſimpleſt poſſible forms, are to this day beyond the reach of inveſtigation. What then ſhould be our expectations in caſes where millions of particles are acting at once, of forms unobſerved, and with forces unknown, and where the object is not a determination of an average reſult of many, where the preciſe ſtate of an individual particle need not be known, but where it is this very preciſe ſtate of each ſingle particle that we want to know? What can it be but uncertainty and miſtake?

46 The advan[illegible] de[illegible] mathematical philoſophy.

Notwithſtanding theſe diſcouraging circumſtances, we muſt obſerve that this kind of inquiry has greatly improved of late years, along with the improvement and extenſion of mathematical philoſophy, and ſince philoſophers have given over their inceſſant attempts to explain every thing by impulſe; and we need not deſpair of making ſtill farther advances, if we will content ourſelves with going no farther than Newton has done in his explanation of the planetary motions. He has immortalized his own name, and has added immenſely to our ſtock of uſeful knowledge: yet he has ſtopped ſhort at the diſcovery of the fact of univerſal gravitation; and all who have endeavoured to explain or account for this fact have only expoſed themſelves to pity. We may perhaps be one day able to demonſtrate from the phenomena that the particles of matter have certain mutual tendencies to or from each other, exerted according to fixed or invaried rules; and from theſe tendencies we may be able to explain many other phenomena, and predict the conſequences, with as much certainty and evidence as an aſtronomer calculates a future eclipſe. This would be a great acquiſition, and perhaps more is impoſſible: and the road to this has been hinted by Sir Iſaac Newton, who has expreſſed his ſuſpicion, that as the great movements of the ſolar ſyſtem are regulated by univerſal gravitation, ſo the mutual actions of the particles of matter are produced and regulated by tendencies of a ſimilar kind, *equally* but not *more* inexplicable, and of which the laws of action are to be diſcovered by as careful an attention to the phenomena, and by the ſame patient thinking, which he has employed on the planetary motions. And a beautiful introduction to this new and almoſt unbounded field of inquiry has been given us by the celebrated Abbé Boſcovich, in his Theory of Natural Philoſophy, where he has ſhown how ſuch mutual tendencies, ſimilar in every ultimate particle of matter, and modified by conditions that are highly probable, nay almoſt demonſtrable, will not only produce the ſenſible forms of ſolidity, hardneſs, elaſticity, ductility, fluidity, and vapour, under an inconceivable variety of ſubordinate appearances, and the obſerved laws of ſenſible motion, but will go far to explain the phenomena of fuſion, congelation, ſolution, cryſtallization, &c. &c. &c. both in chemiſtry and phyſiology. We earneſtly recommend this work to the peruſal of all who wiſh to obtain a diſtinct notion of the internal conſtitution of natural bodies, and of the way in which the uniting forces produce their ultimate and ſenſible effects. Any perſon, poſſeſſed of a moderate ſhare of mathematical knowledge, will be convinced that the proceſs of nature is not very different from what he deſcribes; and that much of what we obſerve muſt happen as he ſays, even although the ultimate atoms of matter are not inextended mathematical points, accompanied with attracting and repelling forces.

47 Our ignorance ſtill great, and the probable increaſe of knowledge among poſterity.

But we have many ſteps to make before we begin this ſtudy: Nature opens to us an immenſe volume; and we doubt not that our poſterity will long find employment in the peruſal, even though advancing with the eagerneſs and ſucceſs of the laſt century. We have not yet arrived at the threſhold in many parts of this reſearch: In many parts of chemiſtry, for inſtance, we are as yet uncertain with reſpect to the phenomena themſelves, which are to be the ſubjects of this diſcuſſion. The compoſition of bodies muſt be fully underſtood before we begin to ſpeak of the forces which unite their particles, or ſpeculate about their modes of action. As long as water was conſidered as an element, we were ignorant of the forces inherent in its particles; we are perhaps ſtill ignorant of this; but we now know that they are extremely different from what we formerly ſuppoſed them to be. It is but in a very few, if in any, caſes of chemical combination, that we even know what are the ingredients: till we know this, it is too ſoon to ſpeculate about their mode of union. Our ignorance in the real events in the animal and vegetable economy is ſtill greater. Our firſt taſk therefore is to proceed, as we are now doing, in the accurate examination and claſſification of the phenomena themſelves; and, without attempting to bring them within the pale of mathematical philoſophy, by attempting what are called mechanical explanations, let us give up the conſideration of theſe hidden operations, and augment to the utmoſt our liſt of ſecondary laws of viſible but remote connections. All the mechanical ſpeculations of the honourable Robert Boyle about the ſenſible qualities of things are now forgotten; but his chemical experiments preſerve all their value, and are frequently referred to. The ſame may be ſaid of the ſagacious Dr Hales, whoſe fanciful notions of internal conflicts, and colliſions, and vibrations, derogate nothing from the value of the curious facts which he has eſtabliſhed both in the animal and vegetable economy.

48 The particular diviſions of phyſical ſcience in Britain.

This diſtinction in the nature of the phenomena, and this difference in the nature of the knowledge which is to be acquired, and the means which are to be employed

Introduction. ployed for the ſucceſsful proſecution of theſe two branches of general phyſics, has occaſioned a ſtill farther reſtriction (at leaſt in Britain) of the term NATURAL PHILOSOPHY. It is particularly applied to the ſtudy of the phenomena of the firſt claſs, while thoſe of the ſecond have produced the ſciences of CHEMISTRY and PHYSIOLOGY.

Natural philoſophy and chemiſtry have generally been made particular inſtitutions in our ſeminaries of learning, but phyſiology has more commonly been taught in conjunction with anatomy, medicine, and botany.

The phenomena of the firſt claſs have been uſually called MECHANICAL, in order to diſtinguiſh them from thoſe obſerved in the operations of chemiſtry, and in the animal and vegetable economy; and the explanations which have been attempted of ſome of the laſt, by applying the laws obſerved in the phenomena of the firſt claſs, have been called *mechanical explanations*.

As this firſt claſs is evidently but a part of general phyſics, there is ſome impropriety in giving the name *natural philoſophy* to a courſe of doctrines which is confined to theſe alone. Indeed at the firſt inſtitution of univerſities, the lectures given in the *Schola Phyſica* were much more extenſive, comprehending almoſt all the phenomena of the material world: but as all arts and ſciences have improved moſt where the labour has been moſt divided, it was found more conducive to the advancement of knowledge that ſeparate inſtitutions ſhould be founded for the ſtudies of natural hiſtory, chemiſtry, phyſiology, &c.; and thus the phenomena, purely mechanical, and a few others in magnetiſm, electricity, and optics, which either were ſuſceptible of mathematical treatment, or had little connection with the ſtudies of chemiſtry and phyſiology, were left to the care of the profeſſor of natural philoſophy.

As the terms *chemiſtry* and *phyſiology* have been applied to two very important branches of general phyſics, we think that a more ſpecific or characteriſtic name might be appropriated to the other, and that it might very properly be termed MECHANICAL PHILOSOPHY.

It only remains to make a few obſervations on the diſtinctive means of proſecuting theſe ſtudies with ſucceſs, and to point out ſome of the advantages which may reaſonably be expected from a careful proſecution of them: and as the ſecond branch has been fully treated under the ſeveral articles of CHEMISTRY, PHYSIOLOGY, &c. we ſhall confine ourſelves to what is uſually called NATURAL PHILOSOPHY.

49 Mechanical philoſophy defined, and its principles explained.

MECHANICAL PHILOSOPHY may, in conformity with the foregoing obſervations, be defined, "the ſtudy of the ſenſible motions of the bodies of the univerſe, and of their actions producing ſenſible motions, with the view to diſcover their cauſes, to explain ſubordinate phenomena, and to improve art."

The principle upon which all philoſophical diſcuſſion proceeds is, that *every change which we obſerve in the condition of things is conſidered by us as an effect, indicating the agency, characteriſing the kind, and meaſuring the degree, of its cauſe.*

In the language of mechanical philoſophy, the cauſe of any change of motion is called a moving or changing FORCE.

The diſquiſitions of natural philoſophy muſt therefore begin with the conſideration of motion, carefully noticing every affection or quality of it, ſo as to eſtabliſh marks and meaſures of every change of which it is ſuſceptible; for theſe are the only marks and meaſures of the changing forces. This being done, it only remains to apply them to the motions which we obſerve in the univerſe.

50 The laws of motion.

From the general principle of philoſophical diſcuſſion already mentioned, there flow directly two axioms.

1. *Every body perſeveres in a ſtate of reſt, or of uniform rectilineal motion, unleſs affected by ſome moving force.*

2. *Every change of motion is in the direction and in the degree of the force impreſſed.*

Theſe are uſually called the LAWS OF MOTION. They are more properly laws of human judgment, with reſpect to motion. Perhaps they are neceſſary truths, unleſs it be alleged that the general principle, of which they are neceſſary conſequences, is itſelf a contingent though univerſal truth.

By theſe two axioms, applied *in abſtracto* to every variety of motion, we eſtabliſh a ſyſtem of general doctrines concerning motions, according as they are ſimple or compounded, accelerated, retarded, rectilineal, curvilineal, in ſingle bodies, or in ſyſtems of connected bodies; and we obtain correſponding characteriſtics and meaſures of accelerating or retarding forces, centripetal or centrifugal, ſimple or compound.

We have an illuſtrious example of this abſtract ſyſtem of motion and moving forces in the firſt book of [illegible] Newton's Mathematical Principles of Natural Philoſophy. Euler's *Mechanica ſive Scientia Motus*, Hermann's *Phoronomia ſive de Viribus Corporum*, and D'Alembert's *Traité de Dynamique*, are alſo excellent works of the ſame kind. In this abſtract ſyſtem no regard is paid to the caſual differences of moving forces, or the ſources from which they ariſe. It is enough to characteriſe a double accelerating force, for inſtance, that it produces a double acceleration. It may be a weight, a ſtream of water, the preſſure of a man; and the force, of which it is ſaid to be double, may be the attraction of a magnet, a current of air, or the action of a ſpring.

Having eſtabliſhed theſe general doctrines, the philoſopher now applies them to the *general* phenomena of the univerſe, in order to diſcover the nature of the forces which really exiſt, and the laws by which their operations are regulated, and to explain [illegible] ſubordinate phenomena. This is the chief buſineſs of the mechanical philoſopher; and it may with ſome propriety be called *the mechanical hiſtory of nature*.

Some method muſt be followed in this hiſtory of mechanical nature. The phenomena muſt be claſſed by means of their reſemblances, which infer a reſemblance in their cauſes, and theſe claſſes muſt be arranged according to ſome principle. We have [illegible] which appears to us leſs exceptionable than the following.

The principle of arrangement is the generality of the phenomena; and the propriety of adopting this principle ariſes from the probability which it gives us of moſt readily diſcovering the moſt general [illegible] whoſe agency is implicated in all other phenomena [illegible] leſs extent; and therefore ſhould be previouſly diſcuſſed, that we may detect the diſcriminating circumſtances which ſerve to characteriſe the ſubordinate phenomena, and are thus the marks of the diſtinguiſhing and inferior natural powers.

53
The laws of motion are firſt applied to aſtronomical phenomena.

The moſt general of all phenomena is the curvilineal motion of bodies in free ſpace; it is obſerved through the whole extent of the ſolar ſyſtem.

The mechanical hiſtory of nature begins therefore with aſtronomy. Here, from the general phenomena of the planetary motions, is evinced the *fact* of the mutual deflection of every body towards every other body, and this in the inverſe proportion of the ſquares of the diſtance, and the direct proportion of the quantity of matter. This is the fact of UNIVERSAL GRAVITATION, indicating the agency, and meaſuring the intenſity, of the univerſal force of mutual gravity.

Having eſtabliſhed this as an univerſal fact, the natural philoſopher proceeds to point out all the particular facts which are comprehended under it, and whoſe peculiarities characteriſe the different movements of the ſolar ſyſtem. That is, in the language of philoſophy, he gives a theory or explanation of the ſubordinate phenomena; the elliptical motions of the planets and comets, their mutual diſturbances; the lunar irregularities; the oblate figure of the planets; the nutation of the earth's axis; the preceſſion of the equinoxes; and the phenomena of the tides and trade winds: and he concludes with the theory of the parabolic motion of bodies projected on the ſurface of this globe, and the motion of pendulums.

54
The application of this ſcience to the arts of life.

As he goes along, he takes notice of the applications which may be made to the arts of life of the various doctrines which are ſucceſſively eſtabliſhed; ſuch as chronology, aſtronomical calculation, dialling, navigation, gunnery, and the meaſuring of time.

55
The nature of gravitation,

If a ſquare parcel of ſand be lying on the table, and the finger be applied to any part of it to puſh it along the table, that part is removed where you will, but the reſt remains in its place; but if it is a piece of ſand-ſtone of the ſame materials and ſhape, and the finger is applied as before, the whole is moved; the other parts accompany the part impelled by the finger in all its motions.

56
and of coheſion.

From the moon's accompanying the earth in all its motions round the ſun, we infer a moving force which connects the moon and earth. In like manner, we muſt conclude that a moving force connects the particles of the ſtone; for we give the name *force* to every thing which produces motion: We call it the force of COHESION; a term which, like gravitation, expreſſes merely a fact.

This ſeems to be the next phenomenon of the univerſe in point of extent.

57
Mode of inveſtigating the laws of coheſion.

Having, from the general phenomenon, eſtabliſhed the exiſtence of this force, the philoſopher proceeds to aſcertain the laws by which its exertions are regulated; which is the aſcertaining its diſtinctive nature and properties. This he does in the ſame way that he aſcertained the nature of planetary gravitation, *viz.* by obſerving more particularly the various phenomena.

Here is opened a moſt extenſive and varied field of obſervation, in which it muſt be acknowledged that very little regular and marked progreſs has been made. The variety in the phenomena, and the conſequent variety in the nature of the connecting forces, appear as yet inconceivably great; and there ſeems little probability of our being able to detect in them all any ſameneſs, combined with the other diſtinguiſhing circumſtances, as we have done in the caſe of gravity. Yet we ſhould not deſpair. Boſcovich has ſhown, in the moſt unexceptionable manner, that although we ſhall ſuppoſe that every atom of matter is endued with a perfectly ſimilar force, acting in a certain determined ratio of the ſmall and imperceptible diſtances at which the particles of matter are arranged with reſpect to each other, the external or ſenſible appearances may, and muſt, have all that variety which we obſerve. He alſo ſhows very diſtinctly how, from the operation of this force, muſt ariſe ſome of the moſt general and important phenomena which characteriſe the different forms of tangible bodies.

We obſerve the chief varieties of the action of this CORPUSCULAR force on the bodies which we denominate *hard*, *ſoft*, *ſolid*, *fluid*, *vaporous*, *brittle*, *ductile*, *elaſtic*. We ſee inſtances where the parts of bodies avoid each other, and require external force to keep them together, or at certain ſmall diſtances from each other. This is familiar in air, vapours, and all compreſſible and elaſtic bodies.

This is evidently a moſt curious and intereſting ſubject of inveſtigation. On the nature and action of theſe corpuſcular forces depends the ſtrength or firmneſs of ſolids, their elaſticity, their power of communicating motion, the preſſure, and motion, and impulſe of fluids; nay, on the ſame actions depend all the chemical and phyſiological phenomena of expanſion, fuſion, congelation, vaporiſation, condenſation, ſolution, precipitation, abſorption, ſecretion, fermentation, and animal and vegetable concoction and aſſimilation.

Out of this immenſe ſtore of phenomena, this inexhauſtible fund of employment for our powers of inveſtigation, the natural philoſopher ſelects thoſe which lead directly to the production or modification of ſenſible motion.

He will therefore conſider,

58
The production of motion by impulſe has been thought the moſt familiar fact in nature.

1. The communication of motion among detached and free bodies, eſtabliſhing the laws of impulſe or colliſion. This has always been conſidered as the elementary doctrine of mechanical philoſophy, and as the moſt familiar fact obſerved in the material world; and in all ages philoſophers have been anxious to reduce all actions of bodies on each other to impulſe, and have never thought a phenomenon completely explained or accounted for till it has been ſhown to be a caſe of impulſe. This it is which has given riſe to the hypotheſes of vortices, ethers, magnetic and electric fluids, animal ſpirits, and a multitude of fancied intermediums between the ſenſible maſſes of matter, which are ſaid in common language to act on each other. A heavy body is ſuppoſed to fall, becauſe it is impelled by a ſtream of an inviſible fluid moving according to certain conditions ſuited to the caſe. The filings of iron are ſuppoſed to be arranged round a magnet, by means of a ſtream of magnetic fluid iſſuing from one pole, circulating perpetually round the magnet, and entering at the other pole, in the ſame manner as we obſerve the flote-graſs arranged by the current of a brook.

59
But this opinion is very queſtionable.

But the philoſopher who has begun the mechanical ſtudy of nature by the abſtract doctrines of dynamics, and made its firſt application to the celeſtial phenomena, and who has attended carefully to the many analogies between the phenomena of gravitation and cohesion, will be at least ready to entertain very different notions of this matter. He will be so far from thinking that the production of motion by impulse is the moſt familiar fact in nature, that he will acknowledge it to be comparatively very rare; nay, there are ſome appearances in the facts, which are uſually conſidered as instances of impulſion, which will lead him to doubt, and almoſt to deny, that there has *ever been obſerved* an inſtance of one body putting another in motion by coming into abſolute contact with it, and ſtriking it; and he will be diſpoſed to think that the production of motion in this caſe is preciſely ſimilar to what we obſerve when we gently puſh one floating magnet towards another, with their ſimilar poles fronting each other. There will be the ſame production of motion in the one and diminution of it in the other, and the ſame uniform motion of the common centre of gravity: and, in this caſe of the magnets, he ſees completely the neceſſity of a law of motion, which is not an axiom, but is obſerved through the whole of nature, and which receives no explanation from any hypotheſis of an intervening fluid, but is even totally inconſiſtent with them. We mean, "that every action of one body on another is accompanied by an equal and oppoſite action of that other on the firſt." This is uſually called the *equality of action and reaction*: it is not intuitive, but it is univerſal; and it is a neceſſary conſequence of the perfect ſimilarity of the corpuſcular forces of the ſame kinds of matter. This general fact, unaccountable on the hypotheſis of impelling fluids, is conſidered in the planetary motions as the unequivocal indication of the ſameneſs of that gravity which regulates them all. The rules of good reaſoning ſhould make us draw the ſame concluſion here, that the particles of tangible matter are connected by equal and mutual forces, which are the *immediate cauſes* of all their ſenſible actions, and that theſe forces, like gravitation, vary with every change of diſtance and ſituation.

60 Motion ſeems to be produced from the equality of action and reaction.

The laws of colliſion and impulſion being now eſtabliſhed, either as original facts or as conſequences of the agency of equal and mutual forces which connect the particles of matter, the philoſopher conſiders,

61 Of motion as it reſpects the theory of machines, &c.

2. The production of motion by the intervention of ſolid bodies, where, by reaſon of the coheſion of matter, ſome of the motions are neceſſarily confined to certain determinate paths or directions. This is the caſe in all motions round fixed points or axes, or along planes or curves which are oblique to the action of the forces.

62 MECHANICS.

This part of the ſtudy contains the theory of machines, pointing out the principles on which their energy depends, and conſequently furniſhing maxims for their conſtruction and improvement. But theſe obſervations do not complete the diſcuſſion of the mechaniſm of ſolid bodies: they are not only ſolid and inert, but they are alſo heavy; therefore the action of gravity muſt be combined with the conſequences of ſolidity. This will lead to diſcuſſions about the centre of gravity, the theory and conſtruction of arches and roofs, the principles of ſtability and equilibrium, the attitudes of animals, and many particulars of this kind.

63 The nature and definition of fluidity.

3. The philoſopher will now turn his attention to another form, in which tangible matter exhibits many intereſting phenomena, viz. FLUIDITY. The firſt thing to be attended to here is, *What is that particular form of exiſtence?* What is the preciſe phenomenon which characteriſes fluidity? What is the definition of a fluid? This is by no means an eaſy queſtion, and conſiderable objections may be ſtated againſt any definition that has been given of it. Sir Iſaac Newton ſays, that *a fluid is a body whoſe particles yield to the ſmalleſt impreſſion, and by ſo yielding are eaſily moved among themſelves*. It may be doubted whether this be ſufficiently preciſe; what is meant by the *ſmalleſt impreſſion?* and what is *eaſily* moving? Is there any preciſe degree of impreſſion to which they do not yield; and do they oppoſe any reſiſtance to motion? And a ſtronger objection may be made: It is not clear that a body ſo conſtituted will exhibit all the appearances which a body acknowledged to be fluid does really exhibit. Euler offers ſome very plauſible reaſons for doubting whether it will account for the horizontal ſurface, and the complete propagation of preſſure through the fluid in every direction; and therefore prefers ſelecting *this laſt phenomenon*, the propagation of preſſure *quaqua verſum*, as the characteriſtic of fluidity, becauſe a body having this conſtitution (on whatever circumſtances it may depend) will have every other obſerved property of a fluid. But this definition is hardly ſimple or perſpicuous enough; and we think that the objections againſt Newton's more ſimple and intelligible definition are not unanſwerable. Boſcovich defines a fluid to be, *a body whoſe particles exert the ſame mutual forces in all directions*; and ſhows, that their particles muſt be indifferent, as to any poſition, with reſpect to each other. If no external force act on them, they will remain in every poſition, and will have no tendency to arrange themſelves in one poſition rather than another; differing in this reſpect from the particles of ſolid, or ſoft, or viſcid bodies; which require ſome force to change their reſpective poſitions, and which recover theſe poſitions again when but gently diſturbed. He illuſtrates this diſtinction very beautifully, by comparing a parcel of balls thrown on quickſilver, and attracting each other, with a parcel of magnets in the ſame ſituation. The balls will ſtick together, but *in any poſition;* whereas the magnets will always affect a particular arrangement.

64 Of the preſſure and equilibrium of fluids, or Hydroſtatics.

When the characteriſtic phenomenon of fluidity has been ſelected, the philoſopher proceeds to combine this property with gravity, and eſtabliſhes the doctrines of HYDROSTATICS, or of the preſſure and equilibrium of heavy fluids, the propagation of this preſſure in every direction; and demonſtrates the horizontality of ſurface aſſumed by all perfect fluids.

Theſe doctrines and principles enable us to determine ſeveral very intereſting circumſtances reſpecting the mutual preſſure of ſolids and fluids on each other; the preſſures exerted on the bottoms and ſides of veſſels; the ſupport and whole mechaniſm of floating bodies, &c.

65 Of the motion of fluids, or Hydraulics.

He then conſiders how fluids will move when their equilibrium of preſſure is deſtroyed; and eſtabliſhes the doctrines of HYDRAULICS, concerning all the modifications of this motion, ariſing from the form of the veſſels, or from the intenſity or direction of the preſſure which occaſions it. And this doctrine is completed by the conſideration of the reſiſtance which fluids oppoſe to the motion of ſolid bodies through them, and their impulſe on bodies oppoſed to their action.

Theſe are very important matters, being the foundations of many mechanical arts, and furniſhing us with ſome of our moſt convenient and efficacious powers for

[illegible]

impelling machines. They are alſo of very difficult diſcuſſion, and are by no means completely inveſtigated or eſtabliſhed. Much remains yet to be done both for perfecting the theories and for improving the arts which depend on them.

66
The importance and difficulty of theſe branches of ſcience.

It is evident, that on theſe doctrines depend the knowledge of the motions of rivers and of waves; the buoyancy, equilibrium, and ſtability of ſhips; the motion of ſhips through the waters; the action of the winds on the ſails; and the whole arts of marine conſtruction and ſeamanſhip.

67
The nature and definition of vapour.

There is another general form of tangible matter which exhibits very different phenomena, which are alſo extremely intereſting; we mean that of VAPOUR. A vapour is a fluid; and all the vapours that we know are heavy fluids: they are therefore ſubject to all the laws of preſſure and impulſe, which have been conſidered under the articles HYDRODYNAMICS. But they are ſuſceptible of great compreſſion by the action of external forces, and expand again when theſe forces are removed. In conſequence of this compreſſion and expanſion, the general phenomena of fluidity receive great and important modifications; and this claſs of fluids requires a particular conſideration. As air is a familiar inſtance, this branch of mechanical philoſophy has been called PNEUMATICS.

68
The doctrine of air, or pneumatics.

Under this head we conſider the preſſure of the atmoſphere, and its effects, both on ſolid and fluid bodies. It produces the riſe of waters or other fluids in pumps and ſyphons, and gives us the theory of their conſtruction: it explains many curious phenomena of nature, ſuch as the motions in the atmoſphere, and their connection with the preſſure of the air, and its effect on the barometer or weather-glaſs. Air, when in motion, is called *wind;* and it may be employed to impel bodies. The theory of its action, and of its reſiſtance to moving bodies, are therefore to be conſidered in this place.

But beſides their motions of progreſſion, &c. ſuch as we obſerve in winds, compreſſible or elaſtic fluids are ſuſceptible of what may be termed *internal motion;* a kind of undulation, where the contiguous parts are thrown into tremulous vibrations, in which they are alternately condenſed and rarefied; and theſe undulations are propagated along the maſs of elaſtic fluid, much in the ſame way in which we obſerve waves to ſpread on the ſurface of water. What makes this an intereſting ſubject of conſideration is, that theſe undulations are the more ordinary cauſes of ſound. A trembling chord, or ſpring, or bell, agitates the air adjoining to it: theſe agitations are propagated along the air, and by its intervention agitate the organ of hearing. The mechaniſm of theſe undulations has been much ſtudied, and furniſhes a very beautiful theory of muſical harmony.

69
Of the compreſſibility of elaſtic fluids, and its conſequences.

The philoſopher examines the *law of compreſſibility* of air and other elaſtic fluids; and thus gets the knowledge of the conſtitution of the atmoſphere, and of the action of thoſe fluids when employed to impel ſolid bodies. Gunpowder contains an immenſe quantity of permanently elaſtic air, which may be ſet at liberty by inflammation. When this is done at the bottom of a piece of ordnance, it will impel a ball along the barrel, and diſcharge it from the muzzle, in the ſame way that an arrow is impelled by a bow. And thus having diſcovered in what degree this air preſſes in proportion to its expanſion, we diſcover its action on the ball through the whole length of the piece, and the velocity which it will finally communicate to it. Here then is contained a theory of artillery and of mines.

70
Of the converſion of bodies into elaſtic fluids by fire.

Chemiſtry teaches us, that moſt bodies can be converted by fire into elaſtic fluids, which can be employed to act on other bodies in the way of preſſure or impulſe. Thus they come under the review of the mechanical philoſopher; and they have become intereſting by being employed as moving forces in ſome very powerful machines.

Theſe diſcuſſions will nearly exhauſt all the general mechanical phenomena. There remain ſome which are much more limited, but furniſh very curious and important ſubjects of inveſtigation.

71
Of the phenomena of loadſtone, or magnetiſm.

The phenomena exhibited between loadſtones or magnets and iron have long attracted attention; and the uſe to which the polarity of the loadſtone has been applied, namely, the directing the courſe of a ſhip through the pathleſs ocean, has rendered theſe phenomena extremely intereſting. They are ſpecified by the term MAGNETISM. Conſiderable progreſs has been made in the arrangement and generalization of them; but we have by no means been able hitherto to bring them all under one ſimple fact. The attention has been too much turned to the diſcovery of the ultimate cauſe of magnetiſm; whereas we ſhould have rather employed our ingenuity in diſcovering all the general laws, in the ſame manner as Kepler and Newton did with reſpect to the celeſtial phenomena, without troubling themſelves with the cauſe of gravitation. Dr Gilbert of Colcheſter was the firſt who conſidered the magnetical phenomena in the truly philoſophical manner; and his treatiſe *De Magnete* may be conſidered as the firſt and one of the moſt perfect ſpecimens of the Baconian or inductive logic. It is indeed an excellent performance; and when we conſider its date, 1580, it is a wonder. Æpinus's *Tentamen Theoriæ Magnetiſmi* is a moſt valuable work, and contains all the knowledge which we have as yet of the ſubject.

72
Of electrical phenomena.

There is another claſs of mechanical phenomena which have a conſiderable affinity with the magnetical; we mean the phenomena called ELECTRICAL. Certain bodies, when rubbed or otherwiſe treated, attract and repel other bodies, and occaſion a great variety of ſenſible motions in the neighbouring bodies. Philoſophers have paid much attention to theſe appearances of late years, and eſtabliſhed many general laws concerning them. But we have not been more ſucceſsful in bringing them all under one fact, and thus eſtabliſhing a complete theory of them, than in the caſe of magnetiſm. Franklin and Æpinus are the authors who have been moſt ſucceſsful in this reſpect. Dr Franklin in particular has acquired great celebrity by his moſt ſagacious compariſon of the phenomena; which has enabled him to eſtabliſh a few general laws, almoſt as preciſe as thoſe of Kepler, and of equally extenſive influence. His diſcovery too of the identity of thunder and electricity has given an importance and dignity to the whole ſubject.

73
Theſe are not all mechanical.

There are many phenomena of electricity which cannot be called mechanical, and are of the moſt curious and intereſting kind. As theſe have little connection with any of the other great branches of phyſical ſcience, they have generally been conſidered in treatiſes of natural philoſophy; and along with inquiries into the original cauſe of electricity in general, continue to engage much of our attention.

The appearances which are preſented to us by our ſenſe of ſeeing form another claſs, which have always been conſidered as making a branch of natural philoſophy in all ſeminaries of learning. It does not, however, obviouſly appear, that they are mechanical phenomena. The intimate nature of light is ſtill a ſecret. Fortunately it is not neceſſary to be known to give us a very perfect theory of the chief phenomena. The general laws of optics are ſo few, ſo ſimple, and ſo preciſe, that our theories are perhaps more perfect here than in any other branch of phyſics; but theſe theories are as yet far removed from the rank of primary facts. Many unknown events happen before the phenomenon comes under the hands of the ordinary optician, ſo as to become the ſubjects of the ſimple laws of reflection and refraction.

74 Of the phenomena of viſion.

It may even be doubted, and has been doubted, whether the phenomena of optics are caſes of body in motion; whether all the lines which the optician draws are any thing but the directions along which certain *qualities* are exerted. The ſide of a ball which is next the candle may be bright and the other ſide dark, just as the ſide of a ball which is next the electrical globe is *minus* and the other ſide *plus*; and all this without any intervening medium. Apparition or viſibility may be a quality of a body, depending on the proximity and poſition of another body, without any thing between them, juſt as weight is; and this quality may be cognizable by our faculty of ſeeing alone, juſt as the preſſure of a heavy body is by our feeling alone.

75 It has been doubted whether light is corporeal.

The firſt thing which made it probable that mechanical philoſophy had any thing to do with the phenomena of optics, was the diſcovery of Mr Roemer, "that apparition was not inſtantaneous;" that ſome time elapſed between the illumination of a body and its being ſeen at a diſtance. He diſcovered, that it was not till 40 minutes after the ſun illuminated one of Jupiter's ſatellites that it was ſeen by an inhabitant of this globe. If therefore a ſun were juſt created, it would be 40 minutes before Jupiter would be illuminated by him, and 200 before the Georgian planet would be illuminated. Here then is motion.

76 How optics came to be conſidered as a part of mechanical philoſophy.

It is therefore highly probable that there is ſomething moved; but it is ſtill doubted whether this ſomething, which we call LIGHT, is a matter emitted from the ſhining body, and moving with great velocity, and acting on and affected by other bodies, in the various phenomena of optics, or whether it is a *certain ſtate* of a medium which is thus propagated, as we ſee that waves are propagated along the ſurface of water, or ſonorous undulations through the maſs of air, while the water or air itſelf is hardly moved out of its place. Either of theſe ſuppoſitions makes optics a legitimate branch of mechanical philoſophy; and it is the philoſopher's buſineſs to examine both by the received laws of motion, and ſee which of them gives conſequences which tally with the phenomena. This has been done; and we imagine that a complete incompatibility has been demonſtrated between the conſequences of the undulations of an elaſtic medium, and the phenomena of optics; while the conſequences of the other or vulgar notion on this ſubject are perfectly conſiſtent with mechanical laws. There are ſome things in this hypotheſis very far beyond our power to conceive diſtinctly; but they are all ſimilar in this reſpect to many facts acknowledged by all; and there is no phenomenon that is inconſiſtent with the legitimate conſequences of the hypotheſis. This gives it great probability; and this probability is confirmed by many chemical facts, and by facts in the vegetable economy, which give ſtrong and almoſt undeniable indications of light being a body capable of a chemical union with the other ingredients of inflammable bodies, and of being afterwards ſet at liberty under its own form, as the cauſe or medium of viſion.

77 The nature of light is ſtill undetermined.

But there are queſtions ſimilar to thoſe about the cauſe of gravity, and totally unneceſſary for eſtabliſhing a complete theory of the optical phenomena, for explaining the nature of viſion, the effects of optical inſtruments, the cauſe of colours, the phenomena of the rainbow, halos and parhelia, &c. &c. &c. Only all this theory is unconnected with the principles called mechanical.

78 But we may perfect the ſcience of optics.

Such is the field of obſervation to the mechanical philoſopher of the preſent day. We may hope to extend it, and by degrees apply its doctrines even to the unſeen motions which take place in chemiſtry and phyſiology. But we muſt, in the firſt place, perfect our knowledge and deſcription of the ſenſible motions and actions of bodies. Thoſe of fluids ſtill demand much inveſtigation; and till theſe are thoroughly underſtood, it is not time to attempt penetrating further into the receſſes of nature.

79 The preſent ſtate of the art a very extenſive field of obſervation.

In the proſecution of this ſtudy, it is found that every change which can be obſerved in the ſtate of a body, with reſpect to motion by the action of another body, is accompanied by an equal and oppoſite change in the ſtate of that other body. Thus, in the phenomena of gravitation, it is obſerved that the deflections of the ſun and planets are mutual. The ſame thing is obſerved in the actions of magnets on each other and on iron; it is alſo obſerved in the attractions and repulſions of electrical bodies; and it alſo obtains in all the phenomena of impulſe and of corporeal preſſure. It is therefore an univerſal law of motion, that *action is always equal and oppoſite to reaction*: but this muſt be conſidered merely as a matter of fact, a contingent law of nature, like that of gravitation. The contrary is perfectly conceivable, and involves no contradiction. That this is ſo, is evident from the proceedings of philoſophers, who in every new caſe make it their buſineſs to diſcover by experiment whether this law was obſerved or not. It was among the laſt diſcoveries made by Sir Iſaac Newton in his examination of the celeſtial motions. This being the caſe, it ſhould never be aſſumed as a principle of reaſoning till its operation has been aſcertained by obſervation.

80 Inveſtigation of the law that action is always equal and oppoſite to reaction.

It has been owing to this improper procedure that much falſe reaſoning has been introduced into mechanical philoſophy, and particularly into the theory of impulſion or the communication of motion by impulſe. In conſidering this ſubject, a term has been introduced which has occaſioned much wrangling and miſconception; we mean the term INERTIA. It ſerves indeed to abbreviate language, but it has often miſled the judgement. When uſed with cautious attention to every circumſtance, it expreſſes nothing but the neceſſity of a cauſe to the production of any effect: but it is generally uſed as expreſſing a quality inherent in matter, by which it *reſiſts* any change of ſtate, or by which it maintains its preſent ſtate. Matter is ſaid to be inert; and as every thing which changes the motion of a body is called a *force*, and as this inertia of A is ſuppoſed to change the motion of B, it is called *vis inertiæ*; and yet matter is ſaid to be indifferent as to motion or reſt, and to be inactive. Theſe

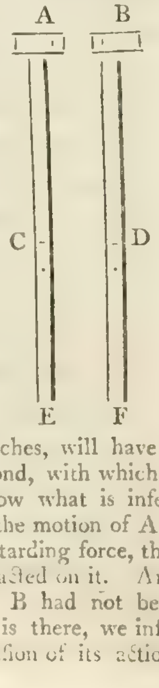
81 The term *inertia* has occaſioned much wrangling and miſconception in this ſcience.

are ſurely very incongruous expreſſions. This obſcure diſcourſe has ariſen from the poverty of all languages, which are deficient in original terms, and therefore employ figurative ones. Force, action, reſiſtance, are all appropriated terms related to our own exertions; and ſome reſemblance between the external effects of theſe exertions and the effects of the connecting qualities of natural bodies, has made us uſe them in our diſquiſitions on theſe ſubjects. And as we are conſcious that, in order to prevent our being puſhed by another from our place, we muſt reſiſt, exerting force; and that our reſiſtance is the reaſon why this other man has not accompliſhed his purpoſe, we ſay, that the quieſcent body reſiſts being put in motion, and that its inertia is diſcovered by the diminution made in the motion of the impelling body: and upon the authority of this *vis inertiæ* as a firſt principle, the phenomena of impulſion are explained, and the law of equal action and reaction is eſtabliſhed.

But all this procedure is in contradiction to the rules of inductive logic; and the obſcurity and confuſion which has ariſen from this original miſconception, the conſequent incongruity of language, and the aukward attempts that have been made to botch and accommodate it to the real ſtate of things, have occaſioned a diſpute, and the only diſpute, in natural philoſophy which has not yet been ſettled, and never can be ſettled, while ſuch miſconceptions are allowed to remain.

82
Its proper meaning, with an example.

If the word *inertia* be taken as expreſſing not a quality of matter, but a law of human judgement reſpecting matter, as expreſſing our neceſſity of inferring the agency of a moving force whenever we obſerve a change of motion, all difficulties will vaniſh, and the equality of action and reaction will be inferred, as it ſhould be, from the phenomena of colliſion. There will be inferred a *vis inſita corpori impellenti*, not *quâ moventi*, but *quâ corpori;* and this inference will carry us through all the myſteries of corporeal action, as it conducted Sir Iſaac Newton in his grand reſearches.



Let us juſt conſider how we reaſon in a new caſe. Let A and B be two magnets faſtened on the ends of two long wooden laths AE, BF, which turn horizontally on pivots C, D, like compaſs needles, with their north poles fronting each other, 12 inches apart; and let A be puſhed towards B, ſo that it would move uniformly with the velocity of two inches in a ſecond. The phenomena *which have been obſerved* are as follow: A will gradually diminiſh its velocity; and when it has advanced about nine inches, will ſtop completely. B, in the mean time will gradually acquire motion; and when it has advanced about nine inches, will have a velocity of about two inches per ſecond, with which it will continue to move uniformly. Now what is inferred from theſe phenomena? Becauſe the motion of A is gradually retarded, we infer that a retarding force, that is, a force in the direction BA, has acted on it. And ſince this would not have happened if B had not been there, and always happens when B is there, we infer that B is either its cauſe or the occaſion of its action. The vulgar ſay that B repels A; ſo ſay the dynamiſts. The abettors of inviſible fluids ſay, that a ſtream of fluid iſſuing from B impels A in the oppoſite direction. All naturaliſts agree in ſaying, that an active force connected with B has deſtroyed the motion of A, and conſider this curious phenomenon as the indication and characteriſtic of a diſcovery. The ſame inference is made from the motion produced in B: it is conſidered by all as effected by a force exerted or occaſioned by the preſence of A; and the dynamiſts and the vulgar ſay that A *repels* B. And both parties conclude, from the equal changes made on both bodies, that the changing forces are equal; here acknowledging, that they *obſerve* an equality of action and reaction; and they add this to the other inſtances of the extent of this law of motion.

All this while no one thinks of the inertia or inactivity of B, but, on the contrary, conclude this to be a curious inſtance of its activity; and moſt people conclude that both bodies carry about with them a *vis inſita* both when at reſt and when in motion.

83
It is doubtful whether actual contact has ever been obſerved.

If other phenomena give unqueſtionable evidence that, in ordinary colliſions, there is the ſame changes of motion, produced without mathematical contact, the ſame inferences muſt be drawn; and a ſcrupulous naturaliſt will doubt whether contact ſhould make any change in our reaſonings on the ſubject, and whether actual contact ever has been or can be obſerved. He will alſo be convinced, that while this is the general, or perhaps univerſal, proceſs of nature in producing motion by impulſe, all explanations of the action of bodies *è diſtanti*, by the intervention of ethers and other inviſible fluids, are nothing but multiplying the difficulties; for in place of one fact, the approach of one magnet (for inſtance) to another, they ſubſtitute millions of unſeen impulſes, each of which equally needs an explanation. And if this fluid be ſuppoſed to produce its effects by any *peculiarity* in its conſtitution, as in the caſe of Newton's elaſtic ether propoſed by him to explain gravitation, the hypotheſis ſubſtitutes, in the moſt unqualified manner, millions of ſimilar phenomena for the one to be explained; for there is the ſame want of a ſecond fluid in order to produce that mutual receſs of the particles of the ether which conſtitutes its elaſticity.

84
The folly of ſuppoſing intervening ethers, &c.

85
The quality of bodies whereby they afford other bodies is inſupportable by us.

And this ſeems to be the limit to our inquiries into all the claſſes of natural phenomena. We find the maſſes or the particles of matter endued in fact with qualities which affect the ſtate of other particles or maſſes, at ſmaller or at greater diſtances from each other according to certain general rules or laws. This ultimate ſtep in the conſtitution of things is inſcrutable by us. It is arrogance in the higheſt degree for us to ſay, that becauſe we do not comprehend how there is inherent in a body any quality by which another body may be affected at any diſtance from it, therefore no ſuch quality *is poſſible*. It is no leſs ſo to ſay, that matter has no active property but that of moving other matter by impulſe; and that becauſe it may be ſo moved, and alſo by the agency of our own minds, therefore, when it is not moved by impulſe, it is moved by minds. The ſame almighty FIAT which brought a particle of matter into exiſtence could bring thoſe qualities equally into exiſtence; and the *how* in both is equally beyond our comprehenſion.

86
This ſhould not, however, ſtop further inquiries.

But, on the other hand, we muſt guard againſt the incurious reſting on this conſideration as a ſtep to further inquiry. There may be ſpecies of matter poſſeſſed

ſed of the mechanical powers, and which notwithſtanding is not cognizable by our ſenſes. All the properties of matter are not known to a perſon who is both deaf and blind; and beings poſſeſſed of more ſenſes may perceive matter where we do not; and many phenomena may really be produced by the action of intervening matter, which we, from indolence or from haſte, aſcribe to the agency of inherent forces. The induſtry of philoſophers has already diſcovered intermedia in ſome caſes. It is now certain that air is the conveyor of ſound, and it is almoſt certain that there is ſuch a thing as light. Let us therefore indulge conjectures of this kind, and examine the conjectures by the received laws of motion, and reject them when we find the ſmalleſt inconſiſtency: and always keep in mind that even the moſt coincident with the phenomena is ſtill but a poſſibility.

87
Theſe obſervations are not phyſical, but metaphyſical.

We may conclude the whole of theſe obſervations with the remark, that theſe queſtions about the activity or inactivity of matter are not phyſical, but metaphyſical. Natural philoſophy, it is true, commonly takes it for granted that matter is wholly inactive; but it is not of any moment in phyſics whether this opinion be true or falſe; whether matter be acted on according to certain laws, or whether it act of itſelf according to the ſame laws, makes no difference to the natural philoſopher. It is his buſineſs to diſcover the laws which really obtain, and to apply theſe to the ſolution of ſubordinate phenomena: but whether theſe laws ariſe from the nature of ſome agent external to matter, or whether matter itſelf is the agent, are queſtions which may be above his comprehenſion, and do not immediately concern his proper buſineſs.

88
The above account points out the beſt method of ſtudy.

The account we have now given of natural philoſophy points out to us in the plaineſt manner the way in which the ſtudy muſt be proſecuted, and the helps which muſt be taken from other branches of human knowledge.

89
This method further explained and exemplified.

The cauſes, powers, forces, or by whatever name we chooſe to expreſs them, which produce the mechanical phenomena of the univerſe, are not obſerved, and are known to us only in the phenomena themſelves. Our knowledge of the mechanical powers of nature muſt therefore keep pace with our knowledge of the motions, and indeed is nothing different from it. In order to diſcover and determine the forces by which the moon is retained in her orbit round the earth, we muſt know her motions. To a terreſtrial ſpectator ſhe appears to deſcribe an ellipſe, having the earth in one focus; but, in the mean time, the earth is carried round the ſun, and the moon's real path, in abſolute ſpace, is a much more complicated figure. Till we know this figure, and the variations in the velocity with which it is deſcribed, we know nothing of the forces which actuate the moon in her orbit.

90
The meaning of ſome terms uſed in ſpeaking of the central motions.

When Newton ſays that the forces by which ſhe is retained in this elliptical orbit are directed to the earth, what does he mean? Only this, that the deflections from that uniform rectilineal motion which ſhe would otherwiſe have performed are always in this direction. In like manner, when he ſays that theſe forces are inverſely proportionate to the ſquares of her diſtances from the earth, he only means that the deflections made in equal times in different parts of her motion are in this proportion. Theſe deflections are conſidered as the characteriſtics and meaſures of the forces. We imagine that we have made all plain when we call this indicated cauſe a *tendency* to the earth; but we have no notion of this tendency to the earth different from the approach itſelf. This word tendency, ſo faſhionable among the followers of Sir Iſaac Newton, is perverted from its pure and original ſenſe. *Tendere verſus ſolem*, is, in the language of Rome, and alſo of Newton, *to go towards the ſun*; but we now uſe the words *tend*, *tendency*, to ſignify, not the *approach*, but the *cauſe* of this approach. And when called upon to ſpeak ſtill plainer, we deſert the ſafe paths of plain language, and we expreſs ourſelves by metaphor: ſpeaking of *niſus*, *conatus ſeſe mutuo accedendi*, *vis centripeta*, &c. When theſe expreſſions have become familiar, the original ſenſe of the word is forgotten, and we take it for granted that the words never had another meaning; and this metaphor, ſprung from the poverty of language, becomes a fruitful ſource of miſconception and miſtake. The only way to ſecure ourſelves againſt ſuch myſtical notions as are introduced by theſe means into philoſophy, is to have recourſe to the way in which we acquire the knowledge of theſe fancied powers; and then we ſee that their names are only names for phenomena, and that univerſal gravitation is only an univerſal mutual approach among the parts of the ſolar ſyſtem.

91
The validity of reaſoning *à priori.*

There is one caſe in which we fondly imagine that we know the cauſe independent of the effect, and that we could have predicted the phenomenon *à priori*; we mean the caſe of impulſe: and hence it is that we are ſo prone to reduce every thing to caſes of impulſion, and that we have fallen upon all theſe ſubterfuges of ethers and other ſubtile fluids. But we might have ſaved ourſelves all this trouble; for after having, by much falſe reaſoning and gratuitous aſſumptions, ſhown that the phenomenon in queſtion *might have been produced* by impulſe, we are no nearer our purpoſe, becauſe that property by which matter in motion puts other matter in motion, is known to us only *by* and *in* the effect.

92
We know nothing of the powers of nature, except by a knowledge of the motions themſelves.

The fair and logical deduction from all this is, that we muſt not expect any knowledge of the powers of nature, the immediate cauſes of the motions of bodies, but by means of a knowledge of the motions themſelves; and that every miſtake in the motions is accompanied by a ſimilar miſtake in the cauſes. It is impoſſible to demonſtrate or explain the gravitation of the planets to him who is ignorant of the properties of the ellipſe, or the theory of gunnery to him who does not know the parabola.

93
A man cannot be a good natural philoſopher without being a mathematician.

A notion has of late gained ground, that a man may become a natural philoſopher without mathematical knowledge; but this is entertained by none who have any mathematics themſelves; and ſurely thoſe who are ignorant of mathematics ſhould not be admitted as judges in this matter. We need only appeal to fact. It is only in thoſe parts of natural philoſophy which have been mathematically treated, that the inveſtigations have been carried on with certainty, ſucceſs, and utility. Without this guide, we muſt expect nothing but a ſchool-boy's knowledge, reſembling that of the man who takes up his religious creed on the authority of his prieſt, and can neither give a reaſon for what he imagines that he be-

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[illegible] lieve, nor again [illegible] with confidence [illegible] probability. We have indeed [illegible] of [illegible], a [illegible], or a [illegible], especially by the [illegible] a Newton, a D'Alembert, or [illegible].

These observations, on the other hand, shew us the nature of the accuracy which may be required, and the rank which natural philosophy holds among the sciences.

94 [illegible]

Motions are the real and only objects of our observation, the only subjects of our discussion. In motion are included no ideas but those of space and time, the subjects of pure mathematical disquisition. As soon, therefore, as we have discovered the fact, the motion, all our future reasonings about this motion are purely mathematical, depending only on the affections of figure, number, and proportion, and must carry along with them that demonstration and irresistible evidence which is the boast of that science. To this are we indebted for that accuracy which is attained, and the progress which has been made in some branches of mechanical philosophy; for when the motions are distinctly and accurately understood, and then considered only as mathematical quantities, independent of all physical considerations, and we proceed according to the just rules of mathematical reasoning, we need not fear any intricacy of composition or multiplicity of steps: we are certain that truth will accompany us, even though we do not always attend to it, and will emerge in our final proposition, in the same manner as we see happen in a long and intricate algebraic analysis.

95 [illegible] demonstrative science.

Mechanical philosophy, therefore, which is cultivated in this way, is not a system of probable opinions, but a *doctrina accurata*, a demonstrative science. To possess it, however, in this form, requires considerable preparation. The mere elements of geometry and algebra are by no means sufficient. Newton could not have proceeded *sine* "*sua mathesi facem preferente*;" and, in creating a new science of physics, he was obliged to search for and discover a new source of mathematical knowledge.

96 [illegible]

It is to be lamented that the taste for the mathematical sciences has so prodigiously declined in this country of late years; and that Britain, which formerly took the lead in natural philosophy, should now be the country where they are least cultivated. Few among us know more than a few elementary doctrines of equilibrium: while, on the continent, we find many authors who cultivate the Newtonian philosophy with great assiduity and success, and whose writings are consulted as the fountains of knowledge by all our countrymen who have occasion to employ the discoveries in natural philosophy in the arts of life. It is to the foreign writers that we have recourse in our seminaries, even for elementary treatises; and while the continent has supplied us with most elaborate and useful treatises on various articles, in physical astronomy, practical mechanics, hydraulics, and optics, there has not appeared in Britain half a dozen treatises worth consulting for these last forty years; and this notwithstanding the unparalleled munificence of our present sovereign, who has given more liberal patronage to the cultivators of mathematical philosophy, and indeed of science in general, than any prince in Europe. The magnificent establishment of Louis XIV. originated from his insatiable ambition and desire of universal influence, directed by the sagacious Colbert. And his patronage being exerted according to a regular plan in the establishment of pensioned academics, and in procuring the combined efforts of the *most eminent* of all countries, his exertions made a conspicuous figure, and filled all Europe with his eulogists. But all this was done without the smallest self-denial, or retrenchment of his own pleasures, the expences being furnished out of the public revenues of a great and oppressed nation; whereas the voyages of discovery, the expensive observations and geodetical operations in Britain, and the numberless unheard-of pensions and encouragements given to men of science and activity, were all furnished out of the private estate of our excellent sovereign, who seems to delight in repaying, by every service in his power, the attachment of a loyal and happy nation. It is therefore devoutly to be wished that his patriotic efforts were properly seconded by those whom they are intended to serve, and that the taste for the mathematical sciences may again turn the eyes of Europe to this country for instruction and improvement. The present seems a most favourable era, while the amazing advances in manufactures of every kind seem to call aloud for the assistance of the philosopher. What pleasure would it have given to Newton or Halley to have seconded the ingenious efforts of a Watt, a Boulton, a Smeaton, an Arkwright, a Dollond; and how mortifying is it to see them indebted to the service of a Belidor, a Bossut, a Clairaut, a Boscovich?

97 [illegible] the ample encouragement from the crown.

We hope to be pardoned for this digression, and return to our subject.

98 Mechanical philosophy is almost wholly a mathematical study.

It appears from what has been said, that mechanical philosophy is almost wholly a mathematical study, and that it is to be successfully prosecuted only under this form: but in our endeavours to initiate the young beginner, it will be often found to require more steadiness of thought than can generally be expected for keeping the mind engaged in such abstract speculations. The object presented to the mind is not readily apprehended with that vivacity which is necessary for enabling us to reason upon it with clearness and steadiness, and it would be very desirable to have some means of rendering the conception more easy, and the attention more lively.

99 Experiments are, however, necessary to insure the attention of young minds.

This may be done by exhibiting to the eye an experiment, which, though but a single fact, gives us a sensible object of perception, which we can contemplate and remember with much more steadiness than any mere creature of the imagination. We could, by an accurate description, give such a conception of a room that the hearer should perfectly comprehend our narration of any occurrence in it: but one moment's glance at the room would be infinitely better. It is usual therefore to employ experiments to assist the imagination of the beginner; and most courses of natural philosophy are accompanied by a series of such experiments. Such experiments, connected by a slight train of argumentative discourse, may even serve to give a notion of the general doctrines, sufficient for an elegant amusement, and even tending to excite curiosity and engage in a serious prosecution of the study. Such are the usual courses which go by the name of experimental philosophy: but this is

Experimental Philosophy.

is a great misapplication of the term; such courses are little more than *illustrations* of known doctrines by experiments.

120 Experimental philosophy defined and explained.

Experimental Philosophy is the investigation of general laws, as yet unknown, by experiment; and it has been observed, under the [illegible], that this is the most infallible (and indeed the sole) way of arriving at the knowledge of them. This is the *Novum Organum Scientiarum* strongly recommended by Lord Bacon. It was new in his time, though not altogether without example; for it is the procedure of nature, and is followed whenever curiosity is excited. There was even extant in his time a very beautiful example of this method, viz. the Treatise of the Loadſtone, by Dr Gilbert of Colcheſter; a work which has hardly been excelled by any, and which, when we conſider its date, about the year 1580, is really a wonderful performance.

The moſt perfect model of this method is the Optics of Sir Iſaac Newton. Dr Black's Eſſay on Magneſia is another very perfect example. Dr Franklin's Theory of Electricity is another example of great merit. That the inveſtigation is not complete, nor the concluſions certain, is not an objection. The method is without fault; and a proper direction is given to the mind for the experiments which are ſtill neceſſary for eſtabliſhing the general laws.

121 A good treatiſe on the method of inquiry by experiment very neceſſary.

It were much to be wiſhed that ſome perſon of talents and of extenſive knowledge would give a treatiſe on the method of inquiry by experiment. Although many beautiful and ſucceſsful examples have been given in particular branches of inquiry, we have but too many inſtances of very inaccurate and inconcluſive inveſtigations. Experiments made at random, almoſt without a view, ſerve but little to advance our knowledge. They are like ſhapeleſs lumps of ſtone merely detached from the rock, but ſtill wanting the ſkill of the builder to ſelect them for the different purpoſes which they may chance to ſerve; while well-contrived experiments are blocks cut out by a ſkilful workman, according as the quarry could furniſh them, and of forms ſuited to certain determined uſes in the future edifice. Every little ſeries of experiments by Margraaf terminates in a general law, while hardly any general concluſion can be drawn from the numberleſs experiments of Pott. Lord Bacon has written much on this ſubject, and with great judgement and acuteneſs of diſtinction; but he has exceeded in this, and has fatigued his readers by his numerous rules; and there is in all his philoſophical works, and particularly in this, a quaintneſs and affectation that greatly obſcure his meaning, ſo that this moſt valuable part of his writings is very little read.

122 An objection to experimental inquiry.

A formidable objection has been made to this method of inquiry. Since a phyſical law is only the expreſſion of a general fact, and is eſtabliſhed only in conſequence of our having obſerved a ſimilarity in a great number of particular facts; and ſince the great rule of inductive logic is to give the law no greater extent than the induction on which it is founded—how comes it that a few experiments muſt be received as the foundation of a general inference? This has been anſwered in very general terms in the article Philosophy. But it will be of uſe to conſider the ſubject a little more particularly. [illegible] evidence by Dr Campbell in his Philoſophy of Rhetoric.

123 [illegible] nature and [illegible]

An attentive conſideration of the objects around us, will inform us that they are generally of a complicated nature, not only as conſiſting of [illegible] of thoſe qualities of things called accidents, ſuch as gravity, mobility, colour, figure, heat, [illegible] which are common to all bodies; but also [illegible] a great variety of ſubſtances, very different in their nature and properties; and each of them is perhaps compounded of ingredients more ſimple.

Moreover, the farther we advance in the knowledge of nature, we find the more reaſon to be convinced of her conſtancy in all her operations. [illegible] always produced like effects, and like effects have always been preceded by like cauſes. [illegible] appears in Nature's [illegible]; and a more refined experience [illegible], and that there is no inconſtancy [illegible] our ſatisfaction in this way.

Moſt of the objects being of a complicated nature, we find, on an accurate [illegible], that the [illegible] led to them ought often to [illegible] to one or more of theſe component parts, while the others either do not contribute to them, or hinder their production; and the variety of nature is ſo great, that hardly any two individuals of [illegible] in every reſpect like any other. On all theſe accounts we expect diſſimilitudes in the phenomena accompanying perfectly ſimilar [illegible] kind; but we find, [illegible] that the [illegible] phenomena [illegible] ſimilar [illegible] long and extenſive [illegible] that there are certain circumſtances which inſure us in the perfect ſimilarity of [illegible]. When we obſerve the effect of [illegible] one of theſe, we [illegible] that the ſame will be produced on any other.

Should a botaniſt meet with a plant new to him, and obſerve that it has ſeven monopetalous flowers, he will conclude with the utmoſt confidence that every plant of this ſpecies will have monopetalous flowers; but he will not ſuppoſe that it will have ſeven, and no more than ſeven, flowers. Now [illegible] difference to warrant ſuch a difference in the concluſion; which may therefore [illegible] one example of both.

But it is not from this [illegible] the concluſion. Had he never before taken notice of any plant, he would not have [illegible] theſe remarks. But his mind [illegible] this unknown ſpecies to all the known ſpecies of the genus, and to all the genera of the ſame order; and having experienced in [illegible] uniformity in every ſpecies, genus, and order, [illegible] as boundleſs [illegible] and culture, he learns to mark the difference, and draws the [illegible] concluſions. [illegible] *perfect* uniformity [illegible] uniformity in [illegible]; and [illegible] moſt that our experience can teach us is a quick diſcrimination of thoſe circumſtances which produce the occaſional varieties.

The nearer that our inveſtigations carry us to the knowledge of *elementary* natures, the more are we convinced by general experience of the uniformity of the operations of real elements; and although it may perhaps be impoſſible for us ever to arrive at the knowledge of the ſimpleſt elements of any body, yet when any thing *appears* ſimple, or rather ſo exactly uniform, as that we have invariably obſerved it to produce ſimilar effects on diſcovering any *new* effect of this ſubſtance, we conclude, from a general experience of the efficient, a like conſtancy in the energy as to the reſt. Fire conſumes wood, melts lead, and hardens clay. In theſe inſtances it acts uniformly, but not in theſe only. We have always found, that whatever of any ſpecies is conſumed by it in one inſtance, has been conſumed by it on trial at any time. If therefore a trial be made for the firſt time of its influence on any particular ſubſtance, he who makes it is warranted to conclude that the effect, whatever it may be, is a faithful repreſentative of its effects on this ſubſtance in all paſt and future ages. This concluſion is not founded on this ſingle inſtance, but upon this inſtance combined with the general experience of the regularity of this element in its operations.

This general concluſion, therefore, drawn from one experiment, is by no means in oppoſition to the great rule of inductive logic, but, on the contrary, it is the moſt general and refined application of it. General laws are here the real ſubject of conſideration; and a law ſtill more general, viz. *that nature is conſtant in all its operations*, is the inference which is here applied as a principle of explanation of a phenomenon which is itſelf a general law, viz. *that nature is conſtant in this operation.*

The foundation of this general inference from one experiment being ſo firmly eſtabliſhed. it is evident that experiments muſt be an infallible method of attaining to the knowledge of nature; and we need only be ſolicitous that we proceed in a way agreeable to the great rule of inductive logic; that is, the ſubject muſt be cleared of every accidental and *unknown* circumſtance, and put into a ſituation that will reduce the intereſting circumſtance to a ſtate of the greateſt poſſible ſimplicity. Thus we may be certain that the event will be a faithful repreſentative of every ſimilar caſe: and unleſs this be done in the preparation, nothing can reſult from the moſt numerous experiments but uncertainty and miſtakes.

104
Mathematics do not ſuperſede the uſe of experiment.

The account which has been given of mechanical philoſophy would ſeem to indicate that experiment was not of much uſe in the farther proſecution of it. The two laws of motion, with the aſſiſtance of mathematics, ſeem fully adequate to the explanation of every phenomenon; and ſo they are to a *certain degree*. But this degree is as yet very limited. Our mathematical knowledge, great as it is in compariſon with that of former times, is ſtill inſufficient for giving accurate ſolutions even of very ſimple (comparatively ſpeaking) queſtions. We can tell, with the utmoſt preciſion, what will be the motions of two particles of matter, or two bodies, which act on each other with forces proportioned to the ſquares of the diſtances inverſely; but if we add a third particle, or a third body, acting by the ſame law, the united ſcience of all Europe can only give an approximation to the ſolution.

105
Experiment is often the only reſource.

What is to be done then in the caſes which come continually before us, where millions of particles are acting at once on each other in every variety of ſituation and diſtance? How ſhall we determine, for inſtance, the motion of water through a pipe or ſluice when urged by a piſton or by its own weight? what will be its velocity and direction? It is impoſſible, in the preſent ſtate of mathematical knowledge, to tell with any preciſion or certainty. And here we muſt have recourſe to experiment. But if this be the caſe, muſt the experiment be made in every poſſible variety of ſituation, depth, figure, preſſure? or is it poſſible to find out any general rules, founded on the general laws of motion, and rationally deduced from them? Or, if this cannot be accompliſhed, will experiment itſelf furniſh any general coincidences which ſhow ſuch mutual dependences, that we may conſider them as indications of general principles, though ſubordinate, complicated, and perhaps inſcrutable? This can be diſcovered by experiment alone.

106
Accurate experiments cannot always be made.

The attention of philoſophers has been directed to each of theſe three chances, and conſiderable progreſs has been made in them all. Numerous experiments have been made, almoſt ſufficient to direct the practice in many important caſes, without the help of any rule or principle whatever. But there are many caſes, and theſe of by far the greateſt importance, ſuch as the motion of a ſhip impelled by the winds, reſiſted by the water, and toſſed by the waves, where diſtinct experiments cannot be made.

107
Example of the neceſſity of experiment.

Newton, Bernouilli, d'Alembert, and others, have laboured hard to deduce from the laws of motion rules for determining what may be called the *average* motion of water in theſe circumſtances, without attempting to define the path or motion of any individual particle; and they have actually deduced many rules which have a great degree of probability. It may here be aſked, why do you ſay *probability?* the rules, as far as they go, ſhould be *certain*. So they are: they are ſtrict deductions from their premiſſes. But the premiſſes are only *ſuppoſitions*, of various degrees of probability, aſſumed in order to ſimplify the circumſtances of the caſe, and to give room for mathematical reaſoning; therefore theſe deductions, theſe rules, muſt be examined by experiment. Some of the ſuppoſitions are ſuch as can hardly be refuſed, and the rules deduced from them are found to tally preciſely with the phenomena. Such is this, "that the velocities of iſſuing water in ſimilar circumſtances are in the ſub-duplicate ratio of the preſſures." * And this rule gives a moſt important and extenſive information to the engineer. Other ſuppoſitions are more gratuitous, and the rules deduced from them are leſs coincident with the phenomena. The patient and ſagacious Newton has repeatedly failed in his attempts to determine what is the *abſolute velocity* of water iſſuing from a hole in the bottom of a veſſel when urged by its weight alone, and the attempts of the others have hardly ſucceeded better. Experiment is therefore abſolutely neceſſary on this head.

Thoſe who have aimed at the diſcovery of *rules* purely experimental on this ſubject, have alſo been pretty ſucceſsful; and the Chevalier Buat has, from a compari-

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ſon of an immenſe variety of experiments made by himſelf and various authors, deduced an empirical rule, which will not be found to deviate from truth above one part in ten in any caſe which has yet come to our knowledge.

This inſtance may ſerve to ſhow the uſe of experiments in mechanical philoſophy. It is proper in all caſes by way of illuſtration; and it is abſolutely neceſſary in moſt, either as the foundation of a characteriſtic of a particular claſs of phenomena, or as argument in ſupport of a particular doctrine. Hydroſtatics, hydraulics, pneumatics, magnetiſm, electricity, and optics, can hardly be ſtudied in any other way; and they are at preſent in an imperfect ſtate, and receiving continual improvement by the labours of experimental philoſophers in all quarters of the world.

108 The advantages derived from the ſtudy of philoſophy

Having in the preceding paragraphs given a pretty full enumeration of the different ſubjects which are to be conſidered in the ſtudy of natural philoſophy, it will not be neceſſary to ſpend much time in a detail of the advantages which may reaſonably be expected from a ſucceſsful proſecution of this ſtudy. It ſtands in no need of panegyric: its intimate connection with the arts gives it a ſufficient recommendation to the attention of every perſon. It is the foundation of many arts, and it gives ſome aſſiſtance to all. Indebted to them for its origin and birth, it has ever retained its filial attachment, and repaid all their favours with the moſt partial affection.

109 in navigation,

To this ſcience the navigator muſt have recourſe for that aſtronomical knowledge which enables him to find his place in the trackleſs ocean; and although very ſmall ſcraps of this knowledge are ſufficient for the mere pilot, it is neceſſary that the ſtudy be proſecuted to the utmoſt by ſome perſons, that the unlearned pilot may get that ſcanty pittance which muſt direct his routine. The few pages of tables of the ſun's declination, which he uſes every day to find his latitude, required the ſucceſſive and united labours of all the aſtronomers of Europe to make them tolerably exact: and in order to aſcertain his longitude with preciſion, it required all the genius of a Newton to detect the lunar irregularities, and bring them within the power of the calculator; and, till this was done, the reſpective poſition of the different parts of the earth could not be aſcertained. Vain would have been the attempt to do this by geodætical ſurveys independent of aſtronomical obſervation. It is only from the moſt refined mechanics that we can hope for ſure principles to direct us in the conſtruction and management of a ſhip, the boaſt of human art, and the great mean of union and communication between the different quarters of the globe.

110 in architecture,

A knowledge of mechanics not much inferior to this is neceſſary for enabling the architect to execute ſome of his greateſt works, ſuch as the erection of domes and arches, which depend on the niceſt adjuſtment of equilibrium. Without this he cannot unite economy with ſtrength: and his works muſt either be clumſy maſſes or flimſy ſhells.

111 in gunnery and other engines, &c.

The effects of artillery cannot be underſtood or ſecured without the ſame knowledge.

The whole employment of the engineer, civil or military, is a continual application of almoſt every branch of mechanical knowledge; and while the promiſes of a Smeaton, a Watt, a Belidor, may be confided in as if already performed, the numberleſs failures and diſappointments in the moſt important and coſtly projects ſhow us daily the ignorance of the pretending crowd of engineers.

The microſcope, the ſteam-engine, the thunder-rod, are preſents which the world has received from the natural philoſopher; and although the compaſs and teleſcope were the productions of chance, they would have been of little ſervice had they not been ſtudied and improved by Gilbert, Hooke, and Dollond.

But it is not in the arts alone that the influence of natural philoſophy is perceived: it lends its aid to every ſcience, and in every ſtudy.

112 [illegible]

It is often neceſſary to have recourſe to the philoſopher in diſputes concerning property; and many examples might be given where great injuſtice has been the conſequence of the ignorance of the judges. Knowledge of nature might have prevented many diſgraceful condemnations for ſorcery.

113 in hiſtory

The hiſtorian who is ignorant of natural philoſophy eaſily admits the miraculous into his narrations, accompanies theſe with his reflections, draws conſequences from them, and fills his pages with prodigies, fables, and abſurdity.

114 in medicine,

It is almoſt needleſs to ſpeak of the advantages which will accrue to the phyſician from this ſtudy. So cloſe is the connection between it and medicine, that our language has given but one name to the naturaliſt and to the medical philoſopher. Indeed, the whole of his ſtudy is a cloſe obſervation of the laws of material nature, in order to draw from them precepts to direct his practice in the noble art of healing. During the immaturity of general knowledge, while natural philoſophy was the only ſtudy which had acquired any juſt pretenſion to certitude either in its principles or method of inveſtigation, the phyſicians endeavoured to bring the objects of their ſtudy within its province, hoping by this means to get a more diſtinct view of it; and they endeavoured to explain the abſtruſe phenomena of the animal functions by reducing them all to motions, vibrations, colliſions, impulſes, hydroſtatic and hydraulic preſſures and actions, with which the mechanical philoſophers were ſo ardently occupied at that time. But unfortunately their acquaintance with nature was then very limited, and they were but little habituated to the rules of juſt reaſoning; and their attempts to explain the economy of animal life by the laws of mechanics did them but little ſervice either for the knowledge of diſeaſes or of the methods of cure. The mechanical theories of medicine, which had conſiderable reputation about the end of the 17th century, were many of them very ingenious, and had an impoſing appearance of ſymmetry and connection; but are now forgotten, having all been formed on the narrow ſuppoſition that matter was ſubject only to mechanical laws.

But the diſcovery of error diminiſhes the chance of again going wrong, eſpecially when the cauſe of error has been diſcovered, and the means pointed out of detecting the miſtakes; and the vital principle muſt combine its influence with, or operate on, the properties of rude matter. It appears therefore evident that a knowledge of the mechanical laws of the material world is not only a convenient, but a neceſſary, accompaniment

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than a phyſician. We are fully juſtified in this opinion, by obſerving medical authors of the preſent day introducing into medicine theories borrowed from mechanical philoſophy, which they do not underſtand, and which they continually miſapply. Appearance of reaſoning frequently conceals the errors in principle, and ſeldom fails to miſlead.

115 In religion. But there is no claſs of men to whom this ſcience is of more ſervice than to thoſe who hold the honourable office of the teachers of religion. Their knowledge in their own ſcience, and their public utility, are prodigiouſly hurt by ignorance of the general frame and conſtitution of nature; and it is much to be lamented that this ſcience is ſo generally neglected by them, or conſidered only as an elegant accompliſhment: nay, it is too frequently ſhunned as a dangerous attainment, as likely to unhinge their own faith, and taint the minds of their hearers. We hope, however, that few are either ſo feebly rooted in the belief of the great doctrines of religion as to fear this, or of minds ſo baſe and corrupted as to adopt and inculcate a belief which they have any ſuſpicion of being ill-founded. But many have a ſort of horror at all attempts to account for the events of nature by the intervention of general cauſes, and think this procedure derogatory to the Divine nature, and inconſiſtent with the doctrine of his particular providence; believing, that "a ſparrow does not fall to the ground without the knowledge of our heavenly Father." Their limited conceptions cannot perceive, that, in forming the general law, the Great Artiſt did at one glance ſee it in its remoteſt and moſt minute conſequences, and adjuſt the vaſt aſſemblage ſo as completely to anſwer every purpoſe of His providence. There never was a more eager enquirer into the laws of nature, or more ardent admirer of its glorious Author, than the Hon. Robert Boyle. This gentleman ſays, that he will always think more highly of the ſkill and power of that artiſt who ſhall conſtruct a machine, which, being once ſet a going, would of itſelf continue its motion for ages, and from its inherent principles continue to anſwer all the purpoſes for which it was firſt contrived, than of him whoſe machine required the continual aid of the hand which firſt conſtructed it. It is owing to great inattention that this averſion to the operation of ſecondary cauſes has any influence on our mind. What do we mean by the introduction of ſecondary cauſes? How do we infer the agency of any cauſe whatever? Would we ever have ſuppoſed any cauſe of the operations of nature, had they gone on without any order or regularity? Or would ſuch a chaos of events, any more than a chaos of exiſtences, have given us any notion of a forming and directing hand? No ſurely. We ſee the hand of God in the regular and unvaried courſe of nature, only becauſe it is regular and unvaried. The philoſopher expreſſes this by ſaying, that the phenomena proceed by unalterable laws. Greatly miſtaken therefore are they who think that we ſuperſede the exiſtence of mind and of providence when we trace things to their cauſes. A phyſical law being an univerſal fact, is an indication, and the ſtrongeſt poſſible indication, of an unerring mind, who is incapable of change, and muſt do to day what He always did: for to change is to deviate from what is beſt *. The operations of unerring mind will therefore be regular and invariable. Phyſical laws, therefore, or ſecondary cauſes, are the beſt proofs of unerring wiſdom. Such regularity of conduct is univerſally conſidered as an indication of wiſdom among men. The wiſe man is known by the conſtancy of his conduct, while no man can depend on the future conduct of a fool.

And what aſtoniſhing evidences of wiſdom do we not obſerve in the general laws of the material world? They will ever be conſidered by the intelligent philoſopher as the moſt glorious diſplay of inconceivable wiſdom, which has been able, by means ſo few and ſo ſimple, to produce effects which by their grandeur aſtoniſh our feeble underſtandings, and by their inexhauſtible variety elude all poſſibility of enumeration.

While the teachers of religion remain ignorant of the beautiful laws of nature, the great characteriſtics of the wiſdom and goodneſs of the Almighty Creator, their hearers are deprived of much ſublime pleaſure; God is robbed of that praiſe which he would have received from an enlightened people; and the only worſhip he receives is tainted with mean notions of his attributes, and groundleſs fears of his power.

But beſides theſe advantages which accrue to different claſſes of men from this ſtudy, there are ſome effects which are general, and are too important to be paſſed over unnoticed.

116 and in other ſciences. That ſpirit of diſpaſſionate experimental enquiry which has ſo greatly promoted this ſtudy, will carry with it, into every ſubject of enquiry, that preciſion and that conſtant appeal to fact and experience which characterize it. And we may venture to aſſert, that the ſuperior good order and method which diſtinguiſh ſome of the later productions in other ſciences, have been in a great meaſure owing to this mathematical ſpirit, the ſucceſs of which in natural philoſophy has gained it credit, and thus given it an unperceived influence even over thoſe who have not made it their ſtudy.

117 More general advantages of philoſophy. The truths alſo which the naturaliſt diſcovers are ſuch as do not in general affect the paſſions of men, and have therefore a good chance of meeting with a candid reception. Thoſe whoſe intereſt it is to keep men in political or religious ignorance, cannot eaſily ſuſpect bad conſequences from improvements in this ſcience; and if they did, have hardly any pretext for checking its progreſs. And diſcoveries accuſtom the mind to novelty; and it will no longer be ſtartled by any conſequences, however contrary to common opinion. Thus the way is paved for a rational and diſcreet ſcepticiſm, and a free enquiry on other ſubjects. Experiment, not authority, will be conſidered as the teſt of truth; and under the guidance of fair experience we need fear no ill as long as the laws of nature remain as they are.

Laſtly, ſince it is the buſineſs of philoſophy to deſcribe the phenomena of nature, to diſcover their cauſes, to trace the connection and ſubordination of theſe cauſes, and thus obtain a view of the whole conſtitution of nature; it is plain that it affords the ſureſt path for arriving at the knowledge of the great cauſe of all, of God himſelf, and for forming proper conceptions of him and of our relations to him: notions infinitely more juſt than can ever be entertained by the careleſs ſpectator of his works. Things which to this man appear ſolitary and detached, having no other connection,

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* *Ferguſon's Lecture on Ethics.*

[illegible]

tion with the rest of the universe in the harmony and [illegible] of creation, will, to the diligent [illegible], declare themselves to be parts of a great and harmonious whole, connected by the general laws of nature, and tending to one grand and beneficent purpose. Such a contemplation is in the highest degree pleasing and cheering, and cannot fail of impressing us with the wish to co-operate in this glorious plan, by acting worthily of the place we hold among the works of God, and with the hope of our deserving all the satisfaction that can arise from contemplation [illegible] knowledge; and this is the worship which God will approve. "This universe (says Boyle) is the magnificent temple of its great Author; and man is ordained, by his powers and qualifications, the high priest of nature, to celebrate divine service in this temple of the universe."

PHYSIOGNOMONICS, among physicians, denote such signs as, being taken from the countenance, serve to indicate the state, disposition, &c. both of the body and mind: and hence the art of reducing these signs to practice is termed *physiognomy*.

P H Y S I O G N O M Y

Word defined, [illegible] signification ancient and modern.

IS a word formed from the Greek *φυσις nature*, and *γνωσκω I know*. It is the name of a science which occupied much of the attention of ancient philosophers, and which, since the revival of learning, has in a great degree been disregarded. Till of late it has seldom in modern times been mentioned, except in conjunction with the exploded arts of magic, alchemy, and judicial aſtrology. Within the laſt two centuries, no doubt, the bounds of human knowledge have been greatly extended by means of the patient purſuit of fact and experiment, inſtead of the haſty adoption of conjecture and hypotheſis. We have certainly diſcovered many of the ancient ſyſtems to be merely creatures of imagination. Perhaps, however, in ſome inſtances, we have decided too rapidly, and rejected real knowledge, which we would have found it tedious and troubleſome to acquire. Such has been the fate of the ſcience of phyſiognomy; which certainly merits to be conſidered in a light very different from alchemy and thoſe other fanciful ſtudies with which it had accidentally been coupled. The work lately publiſhed by M. Lavater on the ſubject has indeed excited attention, and may perhaps tend to replace phyſiognomy in that rank in the circle of the ſciences to which it ſeems to be intitled.

It does not appear that the ancients extended the compaſs of phyſiognomy beyond *man*, or at leaſt animated nature: But the ſtudy of that art was revived in the middle ages, when, miſled probably by the comprehenſiveneſs of the etymological meaning of the word, or incited by the prevalent taſte for the marvellous, thoſe who treated of the ſubject ſtretched the range of their ſpeculation far beyond the ancient limits. The extenſion of the ſignification of the term was adopted univerſally by thoſe naturaliſts who admitted the theory of ſignatures (ſee SIGNATURE); and phyſiognomy came thus to mean, the knowledge of the *internal* properties of *any* corporeal exiſtence from the *external* appearances. Joannes Baptiſta Porta, for inſtance, who was a phyſiognomiſt and philoſopher of conſiderable eminence, wrote a treatiſe on the phyſignomy of *plants (phytognomonica)*, in which he employs phyſiognomy as the generic term. There is a treatiſe likewiſe *De Phyſiognomia Brutorum*, written we believe by the ſame perſon. In the *Magia Phyſiognomica* of Gaſp. Schottus, *phyſiognomia humana* is made a ſubdiviſion of the ſcience.

Boyle too adopts the extenſive ſignification mentioned, which indeed ſeems to have been at one time the uſual acceptation of the word (A). At preſent phyſiognomy ſeems to mean no more than "a knowledge of the moral character and extent of intellectual powers of human beings, from their external appearance and manners." In the Berlin Tranſactions for the years 1769 and 1770 there appears a long controverſial diſcuſſion on the ſubject of the *definition* of phyſiognomy between M. Pernetty and M. Le Cat, two modern authors of ſome note. Pernetty contends that [illegible] is phyſiognomy; Le Cat confines the term [illegible]. Neither ſeems to have hit the medium of truth. Soon after the celebrated book of Lavater appeared. He indeed defines phyſiognomy to be, "the art of diſcovering the *interior of man* by means of his exterior;" but in different paſſages of his work he evidently favours the extended ſignification of Pernetty. This [illegible] to M. Formey's attack upon the [illegible] in the ſame Berlin Tranſactions for 1775. Formey [illegible] controverts the extent aſſigned by Lavater to his favourite ſcience.

Before the era of Pythagoras the Greeks had [illegible] no ſcience, and of courſe could not be ſcientifical phyſiognomiſts. Phyſiognomy, however, [illegible] ted in Egypt and India; and from thence [illegible]

(A) They'll find i' the phyſiognomies
O' th' planets all men's deſtinies. Hudibras.

ſage of Samos probably introduced the rudiments of this ſcience, as he did thoſe of many others, generally deemed more important, into Greece.

3 It was a profeſſion in the time of Socrates.

In the time of Socrates it appears even to have been adopted as a profeſſion. Of this the well-known anecdote of the deciſion of Zopyrus, on the real character of Socrates himſelf, judging from his countenace, is ſufficient evidence. Plato mentions the ſubject; and by Ariſtotle it is formally treated of in a book allotted to the purpoſe.

It may be worth while to give a brief outline of Ariſtotle's ſentiments on the ſubject.

4 General outline of Ariſtotle's opinions on this ſubject.

Phyſiognomy, he in ſubſtance obſerves, had been treated of in three ways: Some philoſophers claſſed animals into genera, and aſcribed to each genus a certain mental diſpoſition correſponding to their corporeal appearance. Others made a farther diſtinction of dividing the genera into ſpecies. Among men, for inſtance, they diſtinguiſhed the Thracians, the Scythians, the Egyptians, and whatever nations were ſtrikingly different in manners and habits, to whom accordingly they aſſigned the diſtinctive phyſiognomical characteriſtics. A third ſet of phyſiognomiſts judged of the actions and manners of *the individual*, and preſumed that certain manners proceeded from certain diſpoſitions. But the method of treating the ſubject adopted by Ariſtotle himſelf was this: A peculiar form of body is invariably accompanied by a peculiar diſpoſition of mind; a human intellect is never found in the corporeal form of a beaſt. The mind and body reciprocally affect each other: thus in intoxication and mania the mind exhibits the affections of the body; and in fear, joy, &c. the body diſplays the affections of the mind.

From ſuch facts he argues, that when in man a particular bodily character appears, which by prior experience and obſervation has been found uniformly accompanied by a certain mental diſpoſition, with which therefore it muſt have been neceſſarily connected; we are intitled in all ſuch caſes to infer the diſpoſition from the appearance. Our obſervations, he conceives, may be drawn from other animals as well as from men: for as a lion poſſeſſes one bodily form and mental character, a hare another, the corporeal characteriſtics of the lion, ſuch as ſtrong hair, deep voice, large extremities, diſcernible in a human creature, denote the ſtrength and courage of that noble animal; while the ſlender extremities, ſoft down, and other features of the hare, viſible in a man, betray the mental character of that puſillanimous creature.

Upon this principle Ariſtotle treats of the corporeal features of man, and the correſpondent diſpoſitions, ſo far as obſerved: he illuſtrates them by the analogy juſt mentioned, and in ſome inſtances attempts to account for them by phyſiological reaſoning.

At the early period in which Ariſtotle wrote, his theory, plauſible certainly, and even probable, diſplays his uſual penetration and a conſiderable degree of knowledge. He diſtinctly notices individual phyſiognomy, national phyſiognomy, and comparative phyſiognomy. The ſtate of knowledge in his time did not admit of a complete elucidation of his general principles; on that account his enumeration of particular obſervations and precepts is by no means ſo well founded or ſo accurate as his method of ſtudy. Even his ſtyle, conciſe and energetic, was inimical to the ſubject; which, to be made clearly comprehenſible, muſt require frequent paraphraſes. Ariſtotle's performance, however, ſuch as it is, has been taken as the groundwork and model of every phyſiognomical treatiſe that has ſince appeared.

The imitators of this great man in the 16th and 17th centuries have even copied his language and manner, which are ſententious, indiſcriminate, and obſcure. His comparative phyſiognomy of men with beaſts has been frequently though not univerſally adopted. Beſides his treatiſe expreſsly on the ſubject, many incidental obſervations on phyſiognomy will be found interſperſed through his other works, particularly in his hiſtory of animals.

5 Theophraſtus's ethic characters form an important branch of phyſiognomy.

Next after Ariſtotle, his diſciple and ſucceſſor Theophraſtus would deſerve to be particularly mentioned as a writer on the ſubject in queſtion. His ethic characters, a ſingular and entertaining performance, compoſed at the age of 99, form a diſtinct treatiſe on a moſt important branch of phyſiognomy, *the phyſiognomy of manners*: but the tranſlations and imitations of La Bruyere are ſo excellent, that by referring to them we do greater juſtice than would otherwiſe be in our power, both to Theophraſtus and to our readers. We cannot, however, omit obſerving, that the accuracy of obſervation and livelineſs of deſcription diſplayed in the work of Theophraſtus will preſerve it high in claſſical rank, while the ſcience of man and the prominent characteriſtics of human ſociety continue to be objects of attention.

6 Other Greek authors on the ſubject.

Polemon of Athens, Adamantius the ſophiſt, and ſeveral others, wrote on the ſubject about the ſame period. Lately there was publiſhed a collection of all the Greek authors on phyſiognomy: the book is intitled, *Phyſiognomiæ veteris ſcriptores Græci, Gr. et Lat. à Franzio Altenb.* 1780, 8vo. From the number of theſe authors, it appears that the ſcience was much cultivated in Greece; but the profeſſors ſeem ſoon to have connected with it ſomething of the marvellous. This we have cauſe to ſuſpect from the ſtory told by Apion of Apelles: *Imaginem adeo ſimilitudinis indiſcretæ pinxit, ut (incredibile dictu) Apion Grammaticus Scriptum reliquerit quemdam ex facie hominum addivinantem (quos metopoſcopos vocant) ex iis dixiſſe aut futuræ mortis annos, aut præteritæ* *. The noviciates of the Pythagorean ſchool were ſubjected to the phyſiognomic obſervation of their teachers, and it is probable the firſt phyſiognomiſts by profeſſion among the Greeks were of this ſect. They, too, to whom, from the nature of their doctrines and diſcipline, myſtery was familiar, were the firſt, it is likely, who expoſed the ſcience of phyſiognomy in Greece to diſgrace, by blending with it the art of divination.

7 The ſcience was then coupled with ſomething of the marvellous.

8 The obſervations of Roman and other writers.

From the period of which we have been treating to the cloſe of the Roman republic, nothing worthy of remark occurs in the literary hiſtory of phyſiognomy. About the laſt mentioned era, however, and from thence to the decline of the empire under the later emperors, the ſcience appears to have been cultivated as an important branch of erudition, and aſſumed as a profeſſion by perſons who had acquired a ſuperior knowledge in it.

In the works of Hippocrates and Galen, many phyſiognomical obſervations occur. Cicero appears to have been peculiarly attached to the ſcience. In his oration

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* *Pliny Nat. Hiſt.* lib. 35. § 35. par. 39.

tion againſt Piſo, and in that in favour of Roſcius, the reader will at the ſame time perceive in what manner the orator employs phyſiognomy to his purpoſes, and find a curious inſtance of the *ancient* manner of oratorical *abuſe*.

Many phyſiognomical remarks are to be found likewiſe in the writings of Salluſt, Suetonius, Seneca, Pliny, Aulus Gellius, Petronius, Plutarch, and others.

That in the Roman empire the ſcience was practiſed as a profeſſion, ample evidence appears in the writings of ſeveral of the authors juſt mentioned. Suetonius, for inſtance, in his *Life of Titus*, mentions that Narciſſus employed a *phyſiognomiſt* to examine the features of Britannicus, who predicted that Britannicus would not ſucceed, but that the empire would devolve on Titus.

9 This ſcience fell with the Roman empire.

The ſcience of phyſiognomy ſhared the ſame fate with all others, when the Roman empire was overthrown by the northern barbarians. About the beginning of the 16th century it began again to be noticed.—From that time till the cloſe of the 17th, it was one of the moſt faſhionable ſtudies. Within that ſpace have appeared almoſt all the approved modern authors on the ſubject (B).

It has been unfortunate for phyſiognomy, that by many of theſe writers it was held to be connected with doctrines of which the philoſophy of the preſent day would be aſhamed. With theſe doctrines it had almoſt ſunk into oblivion.

10 Particular ſtudies have peculiarly prevailed at particular times.

In every period of the hiſtory of literature there may eaſily be marked a prevalence of particular ſtudies. In the early period, for inſtance, of Grecian literature, *mythological morality* claimed the chief attention of the philoſophers. In the more advanced ſtate of learning in Greece and in Rome, *poetry*, *hiſtory*, and *oratory*, held the pre-eminence. Under the latter emperors, and for ſome time afterwards, the hiſtory of *theological controverſies* occupied the greateſt part of works of the learned. Next ſucceeded *metaphyſics*, and *metaphyſical theology*. Theſe gave place to *alchemy*, *magic*, *judicial aſtrology*, the doctrine of ſignatures and ſympathies, the *myſtic*, *theoſophic*, *and Roſicrucian theology*, with phyſiognomy. Such were the purſuits contemporary with the ſcience which is the object of our preſent inquiry. It is no matter of ſurpriſe, that, ſo aſſociated, it ſhould have fallen into contempt. It is not unuſual for mankind haſtily to reject valuable opinions, when accidentally or artificially connected with others which are abſurd and untenable. Of the truth of this remark, the hiſtory of theology, and the preſent tone of theological opinions in Europe, furniſh a pregnant example.

To phyſiognomy, and the exploded ſciences laſt mentioned, ſucceeded *claſſic philology*; which gave place to *modern poetry* and *natural philoſophy*; to which recently have been added the ſtudies of *rational theology*, *chemiſtry*, the *philoſophy of hiſtory*, the *hiſtory of man*, and the *ſcience of police*.

11 The obſervations of the [illegible] ſubject.

About the commencement of the 18th century, and thence forward, the occult ſciences, as they are termed, had declined very conſiderably in the eſtimation of the learned; and thoſe who treated of phyſiognomy forbore to diſgrace it by a connection with thoſe branches of ideal learning with which formerly it had been invariably conjoined. In Britain, Dr Gwither noticed it with approbation.—His remarks are publiſhed in the Philoſophical Tranſactions, vol. xviii.; and Dr Parſons choſe it for the ſubject of the Croonean lectures, publiſhed at firſt in the ſecond ſupplement to the 44th volume of the Philoſophical Tranſactions, and afterwards (1747) in a ſeparate treatiſe, entitled *Human Phyſiognomy explained*.

The obſervations, however, of theſe writers, as well as of Lanciſius, Haller, and Buffon, relate rather to the tranſient expreſſion of the paſſions than to the permanent features of the face and body. The well-known characters of Le Brun likewiſe are illuſtrative of the tranſient phyſiognomy, or (as it is termed) pathognomy.—See *PASSIONS in Painting*.

12 [illegible] nothing very important till the controverſy between Pernetty and Le Cat.

During the preſent century, although phyſiognomy has been now and then attended to, nothing of importance appeared on the ſubject till the diſcuſſion already mentioned between Pernetty and Le Cat, in the Berlin Tranſactions. The ſentiments of theſe authors, in ſo far as relates to the *definition* of phyſiognomy, have been above noticed. Their eſſays are, beſides, employed in diſcuſſing the following queſtions: 1ſt, Whether it would or would not be advantageous to ſociety, were the character, diſpoſition, and abilities, of each individual ſo marked in his appearance as to be diſcovered with certainty?

2dly, Whether, on the ſuppoſition that by the higheſt poſſible proficiency in phyſiognomy, we could attain a knowledge in part only of the internal character, it would be advantageous to ſociety to cultivate the ſtudy, mankind being in general imperfect phyſiognomiſts?

No reaſoning *à priori* can poſſibly determine theſe queſtions. Time and experience alone muſt aſcertain the degree of influence which any particular acquiſition of knowledge would have on the manners and characters of mankind; but it is difficult to conceive how the *reſult* of any portion of knowledge, formerly unknown, and which mankind would be *permitted* to diſcover, could be any thing but beneficial.

13 Lavater's celebrated Work.

Soon after this controverſy in the Berlin Tranſactions, appeared the great work of M. Lavater, dean of Zurich, which has excited no inconſiderable portion of attention in the literary world. The work itſelf is magnificent: That circumſtance, as well as the nature of the ſubject, which was ſuppoſed to be fanciful, have contributed to extend

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(B) They are, Bartholem. Cocles, Baptiſta Porta, Honoratus Nuquetius, Jacobus de Indagine, Alſtedius, Michael Schottus, Gaſpar Schottus, Cardan, Taiſnierus, Fludd, Behmen, Barclay, Claromontius, Conringius, the commentaries of Auguſtin Niphus, and Camillus Balbus on the Phyſiognomica of Ariſtotle.—Spontanus, Andreas Henricus, Joannes Digander, Rud. Goclenius, Alex. Achillinus, Joh. Pretorius, Jo. Belot, Guliel. Gratalorus, &c. They are noticed in the Polyhiſtor of Morhoff, vol. i. lib. i. cap. 15. § 4. and vol. ii. lib. iii. cap. 1. § 4.

extend its fame; and certainly, if we may judge, the book, though many faults may be detected in it, is the most important of any that has appeared on the ſubject ſince the days of Ariſtotle. Lavater profeſſes not to give a complete ſynthetical treatiſe on phyſiognomy, but, aware that the ſcience is yet in its infancy, he exhibits fragments only, illuſtrative of its different parts. His performance is no doubt deſultory and unconnected. It contains, however, many particulars much ſuperior to any thing that had ever before appeared on the ſubject.

With the ſcholaſtic and ſyſtematic method adopted by the phyſiognomiſts of the laſt and preceding centuries, Lavater has rejected their manner of writing, which was dry, conciſe, indeterminate, and general: His remarks, on the contrary, are, for the moſt part, preciſe and particular, frequently founded on diſtinctions extremely acute. He has omitted entirely (as was to be expected from a writer of the preſent day) the aſtrological reveries, and ſuch like, which deform the writings of former phyſiognomiſts; and he has with much propriety deduced his phyſiognomical obſervations but ſeldom from anatomical or phyſiological reaſoning. Such reaſoning may perhaps at ſome future period become important; but at preſent our knowledge of facts, although extenſive, is not ſo univerſal, as to become the ſtable foundation of particular deductions. Lavater has illuſtrated his remarks by engravings; a method firſt adopted by Baptiſta Porta.—Lavater's engravings are very numerous, often expreſſive, and tolerably executed.

14 His opinions the reſult of obſervation.

The opinions of this celebrated phyſiognomiſt are evidently the reſult of actual obſervation. He appears indeed to have made the ſcience his peculiar ſtudy, and the grand purſuit of his life. His performance exhibits an extended comprehenſion of the ſubject, by a particular attention to *oſſeal* phyſiognomy, and the effect of *profiles* and *contours*. His ſtyle in general is forcible and lively, although ſomewhat declamatory and digreſſive. His expreſſions are frequently preciſe, and ſtrikingly characteriſtic; and the ſpirit of piety and benevolence which pervade the whole performance render it highly intereſting.

15 His imagination has, however, often outſtript his judgement.

The defects of the work, however, detract much from the weight which Lavater's opinions might otherwiſe challenge. His imagination has frequently ſo far outſtript his judgement, that an ordinary reader would often be apt to reject the whole ſyſtem as the extravagant reverie of an ingenious theoriſt. He has clothed his favourite ſcience in that affected myſterious air of importance, which was ſo uſual with his predeceſſors, and deſcribes the whole material world to be objects of the univerſal dominion of phyſiognomy *. He whimſically conceives it neceſſary for a phyſiognomiſt to be a well-ſhaped handſome man †. He employs a language which is often much too peremptory and deciſive, diſproportioned to the real ſubſtance of his remarks, or to the occaſion of making them. The remarks themſelves are frequently oppoſite in appearance to common obſervation, and yet unſupported by any illuſtrations of his.

16 Other weakneſſes of this great phyſiognomiſt.

Lavater certainly errs in placing too great a reliance on ſingle features, as the foundation of deciſion on character. His opinions on the phyſiognomy of the ears, hands, nails, and feet of the human ſpecies, on hand-writing, on the phyſiognomy of birds, inſects, reptiles, and fiſhes, are obviouſly premature, as hitherto no ſufficient number of accurate obſervations have been made, in regard to either of theſe particulars, to authoriſe any concluſion. He has erred in the oppoſite extreme, when treating of the important topic of national phyſiognomy, where he has by no means proſecuted the ſubject ſo far as facts might have warranted. We muſt farther take the liberty to object to the frequent introduction of the author's own phyſiognomy throughout the courſe of his work. His ſingular remarks on his own face do not ſerve to prejudice the reader in favour of his judgement, however much his character may juſtify the truth of them. We muſt regret likewiſe, for the credit of the ſcience, that the author's ſingularly fanciful theory of apparitions ſhould ſo nearly reſemble a revival of the antiquated opinions of the ſympathiſts.

To theſe blemiſhes, which we have reluctantly enumerated, perhaps may be added that high impaſſioned tone of enthuſiaſm in favour of his ſcience everywhere diſplayed throughout the work of this author, which is certainly very oppoſite to the cool patient inveſtigation befitting philoſophy. To that enthuſiaſm, however, it is probable that in this inſtance (as is, indeed, no unfrequent effect of enthuſiaſm) we are indebted for the excellency which the author has attained in his purſuit; and it poſſeſſes the ſalutary tendency of putting us on our guard againſt a too implicit acquieſcence in his phyſiognomical deciſions.

17 His work was attacked in the Berlin Tranſactions by M. Formey.

In the Berlin Tranſactions for 1775, there appears a formal attack upon Lavater's work by M. Formey. This eſſay we have already mentioned. After diſputing the propriety of the extenſive ſignification applied by Lavater and Pernetty to the term phyſiognomy, M. Formey adopts nearly the ſame definition which we conceive to be the moſt proper, and which we have put down as ſuch near the beginning of this article. He allows that the mental character is intimately connected with, and ſenſibly influenced by, every fibre of the body; but his principal argument againſt phyſiognomy is, that the human frame is liable to innumerable accidents, by which it may be changed in its external appearance, without any correſpondent change of the diſpoſition; ſo that it ſurpaſſes the extent of the ſkill of mortals to diſtinguiſh the modifications of feature that are natural, from thoſe which may be accidental. Although, therefore, the ſcience of phyſiognomy may be founded in truth, he infers that the Deity only can exerciſe it.

M. Formey further contends, that education, diet, climate, and ſudden emotions, nay even the temperaments of anceſtors, affect the caſt of human features; ſo that the influence of mental character on theſe features may be ſo involved with, or hidden by, accidental circumſtances, that the ſtudy of phyſiognomy muſt ever be attended by hopeleſs uncertainty. Theſe objections are worthy of notice, but they are by no means concluſive.

18 Lavater's mode of treating his ſubject.

We ſhall give a ſpecimen of M. Lavater's manner of treating the ſubject on the oppoſite ſide of the queſtion: A ſpecimen, not in Lavater's preciſe words, but conveying more ſhortly an idea at once of his ſentiments, and of his manner of expreſſing them.

19 Phyſiognomy is juſtly called a ſcience.

No ſtudy, ſays he, excepting mathematics, more juſtly deſerves to be termed *a ſcience* than phyſiognomy. It is a department of phyſics, including theology and belles lettres, and in the ſame manner with theſe ſciences may be reduced to rule. It may acquire a fixed and appropriate character. It may be communicated and taught.

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* Vol. i. p. 33.—8. vol. i. p. 89. French tranſlation.

† Vol. i. p. 126.

Truth or knowledge, explained by fixed principles, becomes ſcience. Words, lines, rules, definitions, are the medium of communication. The queſtion, then, with reſpect to phyſiognomy, will thus be fairly ſtated. Can the ſtriking and marked differences which are viſible between one human face, one human form, and another, be explained, not by obſcure and confuſed conceptions, but by certain characters, ſigns, and expreſſions? Are theſe ſigns capable of communicating the vigour or imbecility, the ſickneſs or health, of the body; the wiſdom, the folly, the magnanimity, the meanneſs, the virtue, or the vice, of the mind?

20 Experiment is limited in extent.

It is only to a certain extent that even the experimental philoſopher can purſue his reſearches. The active and vigorous mind, employed in ſuch ſtudies, will often form conceptions which he ſhall be incapable of expreſſing in words, ſo as to communicate his ideas to the feebler mind, which was itſelf unable to make the diſcovery: But the lofty, the exalted mind, which ſoars beyond all written rule, which poſſeſſes feelings and energies reducible to no law, muſt be pronounced unſcientific.

21 Phyſiognomical truth may be defined and communicated to a certain length.

It will be admitted, then, that to a certain degree phyſiognomical truth may as a ſcience be defined and communicated. Of the truth of the ſcience there cannot exiſt a doubt. Every countenance, every form, every created exiſtence, is individually diſtinct, as well as different, in reſpect of claſs, race, and kind. No one being in nature is preciſely ſimilar to another. This propoſition, in ſo far as regards man, is the foundation-ſtone of phyſiognomy. There may exiſt an intimate analogy, a ſtriking ſimilarity, between two men, who yet being brought together, and accurately compared, will appear to be remarkably different. No two minds perfectly reſemble each other. Now, is it poſſible to doubt that there muſt be a certain native analogy between the external varieties of countenance and form and the internal varieties of the mind? By anger the muſcles are rendered protuberant: Are not, then, the angry mind, and the protuberant muſcles, as cauſe and effect? The man of acute wit has frequently a quick and lively eye. Is it poſſible to reſiſt the concluſion, that between ſuch a mind and ſuch a countenance there is a determinate relation?

Every thing in nature is eſtimated by its phyſiognomy; that is, its external appearance. The trader judges by the colour, the fineneſs, the exterior, the *phyſiognomy* of every article of traffic; and he at once decides that the buyer "has an honeſt look," or "a pleaſing or forbidding countenance."

22 This knowledge, however improved, would not be detrimental to man.

That knowledge and ſcience are detrimental to man, that a ſtate of rudeneſs and ignorance are preferable and productive of more happineſs, are tenets now deſervedly exploded. They do not merit ſerious oppoſition. The extenſion and increaſe of knowledge, then, is an object of importance to man: And what object can be ſo important as the knowledge of man himſelf? If knowledge can influence his happineſs, the knowledge of himſelf muſt influence it the moſt. This uſeful knowledge is the peculiar province of the ſcience of phyſiognomy. To conceive a juſt idea of the advantages of phyſiognomy, let us for a moment ſuppoſe that all phyſiognomical knowledge [illegible] among men, what confuſion, what [illegible], what numberleſs miſtakes, [illegible] to [illegible] hold [illegible]. The knowledge of [illegible] [illegible].

Phyſiognomy is a [illegible] of pure and exalted [illegible] gratification. It affords a new view of the perfection of Deity: it diſplays a new ſource of harmony and beauty in his works; it reveals internal motives, which without it would only have been diſcovered in the world to come. The phyſiognomiſt diſtinguiſhes accurately the permanent from the habitual, the habitual from the accidental, in character. Difficulties, no doubt, attend the ſtudy of this ſcience. The moſt minute ſhades, ſcarcely diſcernible to the unexperienced eye, [illegible] poſition of character. A ſmall inflection, curvature, lengthening or ſharpening, even though but of a hair's-breadth, may alter in an aſtoniſhing degree the expreſſion of countenance and character. How [illegible] then, how impoſſible indeed, muſt this variety of the ſame countenance render preciſion? The ſeat of character is often ſo hidden, ſo maſked, that it can only be detected in certain, perhaps uncommon, poſitions of countenance. Theſe poſitions may be ſo quickly changed, the ſigns may ſo inſtantaneouſly diſappear, and their impreſſion on the mind of the obſerver [illegible], or theſe diſtinguiſhing traits [illegible], that it ſhall be [illegible] language. [illegible], whether phyſical or moral, [illegible], the diverſity of dreſs, of poſition, of [illegible], and to diſplay the countenance [illegible] a point of view, that the [illegible] is [illegible] into an erroneous judgement of the [illegible] of the countenance and character. [illegible] him to overlook the eſſential traits of character, and to form a deciſion on what is [illegible].—How ſurpriſingly, for inſtance, may the ſmall-pox disfigure the countenance, and deſtroy or confound, or render imperceptible, traits otherwiſe the moſt [illegible].

24 Difficulties

We ſhall, then, continues Lavater, [illegible] to the oppoſer of phyſiognomy all he can [illegible]; and yet we do not live without hope that many of the [illegible] ſhall be reſolved which at firſt appeared inexplicable.

26 [illegible] of Lavater's work.

He then proceeds to a ſpecific [illegible] of his ſubject under a great variety of titles, in which he treats of human nature in general, and of each particular feature ſeparately.

To enumerate the different diviſions of his book would not be more ſatisfactory to our readers than the peruſal of the *contents* of the book itſelf; and an attempt to epitomize even the eſſential [illegible] of the vaſt multiplicity of matter contained in his eſſays, (which are yet only *fragments*, and to which indeed he himſelf does not pretend to give any higher appellation), would extend this article to a diſproportionate length. Such an abridgement, [illegible], would convey no ſolid information on a ſubject which merits all the time and ſtudy that an attentive peruſal of Lavater's works at large would require.

From the hiſtorical deduction of the [illegible] of phyſiognomy which we have thus [illegible] before our readers, it appears, that [illegible], there can [illegible]-

ed a period in which any cultivation of ſcience took place when phyſiognomy was not likewiſe the ſtudy, nay ſometimes even the profeſſion, of men of the moſt eminent abilities and the greateſt learning.

The reaſons why at preſent ſo little attention is paid to the ſubject probably are,

1ſt, That it has been treated in conjunction with ſubjects now with propriety exploded: And,

2dly, That it has been injured by the injudicious aſſertions and arguments of thoſe who have undertaken its defence.

Sometimes, however, the wiſe and the learned may err. The uſe of any thing muſt not be rejected for no better reaſon than that it is capable of abuſe. Perhaps the era is not diſtant when phyſiognomy ſhall be reinſtated in the rank which ſhe merits among the valuable branches of human knowledge, and be ſtudied with that degree of attention and perſeverance which a ſubject deſerves ſo eſſentially connected with the ſcience of man.

28 There is a relation between the diſpoſitions of the mind and the features of the face.

That there is an intimate relation between the diſpoſitions of the mind and the features of the countenance is a fact which cannot be queſtioned. He who is ſinking under a load of grief for the death of an affectionate wife or a dutiful child, has a very different caſt of features from the man who is happy in the proſpect of meeting his miſtreſs. A perſon boiling with anger has a threatening air in his countenance, which the moſt heedleſs obſerver never miſtakes; and if any particular diſpoſition be indulged till it become habitual, there cannot be a doubt but that the correſponding traces will be ſo fixed in the face as to be diſcernible by the ſkilful phyſiognomiſt, under every effort made to diſguiſe them. But when we attempt to decide on a man's intellectual powers by the rules of this ſcience, we are often deceived; and in this reſpect we have reaſon to believe that Lavater himſelf has fallen into the groſſeſt miſtakes.

29 Craniognomic ſyſtem of Dr Gall.

Connected with phyſiognomy, we may conſider the *craniognomic* ſyſtem of Dr Gall of Vienna, which is ſo called, becauſe, from the exterior form of the cranium, he infers the powers and diſpoſitions of the mind. The brain, he obſerves, is the material organ of the action of the mind; and as it increaſes in direct proportion to the faculties of animals, he has endeavoured to prove, that the faculties are diſtinct and independent on each other; that each has its proper material organ, and that the expanſion of the organ is in proportion to the ſtrength of the faculty. This ſyſtem is attempted to be eſtabliſhed by the following reaſoning.

"The internal faculties, (ſays Dr Bojanus, the author of a view of this ſyſtem), do not always exiſt in the ſame proportion to each other. There are ſome men who have a great deal of genius without having a memory, who have courage without circumſpection, and who poſſeſs a metaphyſical ſpirit without being good obſervers.

"Beſides, the phenomena of dreaming, of ſomnambuliſm, of delirium, &c. prove to us that the internal faculties do not always act together; that there is often a very great activity of one, while the reſt are not ſenſible.

"Thus, in old age, and ſometimes in diſeaſe, ſuch, for example as madneſs, ſeveral faculties are loſt, while others ſubſiſt; beſides, a continued employment of the ſame faculty ſenſibly diminiſhes its energy: If we employ another, we find it has all the force of which it is ſuſceptible; and if we return to the former faculty, it is obſerved that it has reſumed its uſual vigour. It is thus that, when fatigued with reading an abſtract philoſophical work, we proceed with pleaſure to a poetical one, and then reſume with the ſame attention our former occupation."

"All theſe phenomena prove that the faculties are diſtinct and independent of each other, and we are inclined to believe that the caſe is the ſame with their material organs."

"[We do not entirely agree with this idea of Dr Gall, and we believe, on the contrary, that the ſeparation of the material organs ought to be conſidered as the cauſe of the diſtinction of the internal faculties. It appears, to us at leaſt, that by ſuppoſing the faculties themſelves as originally ſeparated, we cannot ſave ourſelves from falling into materialiſm, which exiſts when the mind is no longer conſidered as unity.]

"*The expanſion of the organs contained in the cranium is in the direct ratio of the force of their correſponding faculties.*"

"This principle, dictated by analogy, reſts on this axiom, that throughout all nature the faculties are always found to be proportioned to their relative organs; and the truth of it is proved in a ſpecial manner by the particular obſervations of Dr Gall.

"It is however to be remarked, that exerciſe has a great influence on the force of the faculties, and that an organ moderately expanded, but often exerciſed, can give a faculty ſuperior to that which accompanies a very extenſive organ never put in action; as we ſee that a man of a weak conformation acquires, by continued exerciſe, ſtrength ſuperior to another of a more athletic ſtructure."

"[We muſt here mention an opinion which ſeems to reſult immediately from this principle, and which, however, is falſe: It is, that the volume of the brain, in general, is in the direct ratio of the energy of its faculties. Obſervation has proved to Dr Gall, that we cannot judge of the ſtrength of the faculties but by the developement of the ſeparate organs which form diſtinct eminences in the cranium; and that a cranium perfectly round, of whatever ſize it may be, is never a proof of many or of great faculties.]

"We do not recollect to have heard the reaſon aſſigned by Dr Gall; but, in our opinion, theſe brains may be conſidered as in a ſtate analogous to obeſity; and as we do not judge of the muſcular force of a man or an animal by the volume of their members, but by the developement of the muſcles in particular, one would think we ought, in like manner, to judge of the ſtrength of the faculties by the developement of the relative organs.

"In the laſt place, the 4th principle, the moſt important for practice in regard to the ſyſtem of Dr Gall, is:

"*We may judge of theſe different organs and of their faculties by the exterior form of the cranium.*

"The truth of this principle is founded upon another, viz. that the conformation of the cranium depends on that of the brain; a truth generally acknowledged, and proved by the anterior part of the brain, by the impreſſions in the anterior part of the cranium, and by other facts.

[There are ſkulls, it is true, in which an external protuberance of the bone correſponds to an interior one; and this irregularity, which is found ſometimes as a diſeaſe, and moſt commonly at an advanced age, when the cerebral organs do not oppoſe the ſame reſiſtance to the cranium, renders the practice of Dr Gall's ſyſtem, in ſome meaſure, uncertain.]

"Guided by theſe principles, Dr Gall examines the nature of the ſkull, compares the crania of animals and thoſe of men analogous and different in faculties. His reſearches have proved to him, in a manner almoſt incontestable, not only the above truths, but that the faculties of animals are analogous to thoſe of man; that what we call inſtinct in animals is found alſo in the latter, ſuch as attachment, cunning, circumſpection, courage, &c.; that the quantity of the organs fixes the difference of the genus of animals, their reciprocal proportion that of individuals; that the diſpoſition originally given to each faculty by nature may be called forth by exerciſe and favourable circumſtances, and ſometimes by diſeaſe, but that it never can be created in the caſe where it has not been given by nature (c); that the accumulation of the organs takes place in a conſtant manner from the hind part forwards, from the bottom to the top, in ſuch a manner, that animals in proportion as they approach man in the quantity of their faculties have the ſuperior and anterior part of the brain more expanded; and, in the laſt place, that in the moſt perfect animal, man, there are organs in the anterior and ſuperior parts of the frontal bone, and of the parietals, deſtined for faculties which belong to them excluſively. It is under the latter point of view that the diſcoveries of Dr Gall agree perfectly with the theory of the facial angle, which ſeems ſtill further to eſtabliſh the truth of them."

Moſt of our readers will probably be ſatisfied with the ſhort view which we have now given of this fanciful and viſionary ſyſtem; but ſuch as wiſh for a fuller expoſition of it, may conſult the Philoſophical Magazine, vol. xiv. p. 77. from which the above is extracted. We ſhall only add the names of a few of the organs, which the author of the ſyſtem thinks he has diſcovered. *Organ of the tenacity of life. Organ of muſic. Organ of fighting. Organ of murder. Organ of cunning. Organ of arithmetic. Organ of thieving, &c.*

PHYSIOLOGY.

INTRODUCTION.

1 Definition and objects of phyſiology.

1. PHYSIOLOGY is that part of phyſical ſcience which treats of the nature, properties, and functions of living bodies; comprehending under this term, animals and vegetables. The word is derived from φυσις, "nature," and λογος, "a diſcourſe;" and ſignified originally what we may call *natural knowledge*.

The object of this ſcience is to examine and compare the phenomena of life; to diſcover the properties, powers, and operations of the bodies that are actuated by this principle, and to purſue the developement, progreſs, and decay of vital energy, from brute matter, which poſſeſſes no portion of vitality, to the moſt perfect animal, which ſeems to have it in the greateſt perfection.

2 Diviſion.

2. Phyſiology may be conſidered under three heads; *hiſtorical*, *philoſophical* or *rational*, and *practical* phyſiology.

3 Hiſtorical phyſiology.

3. *Hiſtorical phyſiology* is occupied in giving a ſimple relation of the facts and phenomena that take place in living bodies; in bringing them together, and comparing thoſe which ſucceed each other without interruption during the exiſtence of vitality.

4 Philoſophical phyſiology.

4. It is the buſineſs of *philoſophical phyſiology* to conſider the nature of theſe phenomena, and endeavour to deduce from them ſome general concluſions, by which they may be explained or elucidated; to draw from them natural conſequences, and unfold ſucceſſively their analogies and relations; to arrange, diſtribute, and claſſify them, and thus acquire ſufficient *data* by which to diſcover the cauſes which produce them.

5 Practical phyſiology.

The *practical* part of phyſiology is intended to point out the application of the principles of the ſcience to the uſeful purpoſes of life, eſpecially to medicine and agriculture. Of theſe diviſions the firſt is the moſt important, as, until we have acquired a pretty complete knowledge of the facts relating to living beings, and arranged theſe in a natural manner, it cannot be expected that we ſhould make any great progreſs in explaining them, or inveſtigating their cauſes. From the multitude, variety, and complex nature of theſe phenomena, a complete view of them is extremely difficult, and requires the united efforts of genius, dexterity, patience, and diſcernment.

6 Relations to anatomy.

Phyſiology is intimately related to ſeveral other departments of natural knowledge. Its relation to anatomy is the moſt ſtrict and natural; and indeed the knowledge of the ſtructure of living bodies is a neceſſary introduction to that of their properties and functions. So cloſe is the union between theſe two ſciences, that it is generally thought that the ſtudy of them ſhould go hand in hand. Certain it is, that, without phyſiology, anatomy is a dry and uninteresting ſtudy; while, on the other hand, phyſiology, unaided by anatomy, is obſcure and uncertain. It is by means of anatomy that we learn the ſtructure and organization of the animal machine; the diſpoſition and form of its ſeveral members; the parts that concur in the compoſition of them; the arrangement and the connection of theſe: it is by means of anatomy that we know how to eſtimate the advan-

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(c) The germ of every organ muſt exiſt in embryo, if the exertion of that organ is to be afterwards called forth.

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ges of any particular conformation; that we eſtimate the proportion between the ſolid and fluid parts of the body, and the adaptation of the organs to the various uſes for which they are deſtined. But we muſt remember, that the aid of anatomy in phyſiological reſearches, extends no farther than to the mechanical arrangement and relation of the ſeveral parts of the body; it teaches us nothing of its intimate compoſition, and much leſs does it inform us reſpecting the vital powers and mental energies diſplayed by the living body. The moſt accurate inſpection of the brain will afford us no light reſpecting the obſcure function of ſenſation, and the hidden operation of thought and judgement; nor will the niceſt diſſection of the eye, or of the tongue, ſhew us how the former is enabled to convey to us the ideas of external objects, or how the latter imparts to us the thouſand varied flavours of ſapid bodies. In ſhort, we may conclude, that the more the exerciſe of any function depends on the ſtructure and organization of the organs that perform it, the more capable is it of illuſtration from anatomy.

7 chemiſtry,

The ſcience of chemiſtry has proved of eminent uſe in explaining ſeveral functions of the animal economy, which, without its aſſiſtance, would have been very imperfectly underſtood. The action of the air on the blood during reſpiration, and the digeſtion of food in the ſtomach, are found to depend chiefly on chemical operations; while this ſcience has explained to us, in a moſt ſatisfactory manner, the nature, compoſition, and reciprocal action of the component principles of organized beings, and the nature of ſeveral changes which they undergo, both in the living and the dead ſtate. But if we extend the application of chemiſtry too far, and imagine, as ſome of our modern chemical phyſiologiſts have done, that it is capable of explaining *life, motion*, and even *ſenſation*, we ſhall only betray our own preſumption and our ignorance of vital phenomena. When the performance of any function depends on the intimate compoſition of its organs, or the combinations and decompoſitions that take place among their component principles; then, and then only, is it ſuſceptible of chemical illuſtration.

8 mechanical philoſophy,

Mechanical philoſophy is employed with advantage in explaining ſome of the phenomena that take place in living beings. The ſtrength and ſolidity of the bony compages; the force and direction of the muſcular motions; the propagation, direction, and mechanical effect of light, ſound, odours; the effects of the gravity and elaſticity of atmoſpheric air, and a few other circumſtances, may be ſubmitted to calculation, and illuſtrated on phyſical principles: but the laws of mechanical and of vital action are, in general, ſo different, and even the moſt mechanical phenomena of living beings are often ſo modified and counteracted by the agency of the vital powers, that, on the whole, we muſt conſider general phyſics as one of the leaſt uſeful auxiliaries of phyſiological reſearches.

9 metaphyſics,

Of all the branches of phyſical ſcience, phyſiology certainly makes the neareſt approach to the region of metaphyſics; but yet there is a difference between theſe, though it may not be very eaſy to point out the preciſe line of termination. Phyſiology, as already defined, being that ſcience which has for its object the organical economy of living bodies, the word organical, we think, here ſhould mark the diſtinction.

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Whenever the economy of living bodies indic[illegible] ſign, and cannot reſult from any combination [illegible] ture of organs, it muſt be ſuppoſed the effe[illegible] thing different from matter, and whoſe expla[illegible] longs to that ſcience which is called *metaph*[illegible] we might term the *philoſophy of the mind.* [illegible], indeed, to the glandular contents within the cranium, and to that fiction animal ſpirits, the motives of action, the ſuperficial and ill-informed may have been led to an opinion that perception, memory, and imagination, are the functions of the *cerebrum*, the *medulla oblongata*, and *cerebellum*; that the ſoul is a conſequence of organization; and the ſcience which treats of it only a particular branch of phyſiology. But mind and its faculties are now ſo well underſtood and inveſtigated, that this opinion can ſeldom prevail but where penetration is not remarkable for its acuteneſs, or where reflection, reading, and reſearch, have long been confined within the limits of a narrow circle.

Some metaphyſical phyſiologiſts contend, that every living ſyſtem of organs ſuppoſes mind, and indeed in the ſtudy of ſuch ſyſtems the phyſiologiſt muſt often meet with many phenomena that are leſs ſingular than ſimple perception, and yet for which he cannot account by any knowledge he poſſeſſes of organic powers. This truth we partly acknowledge, when, like ancient Athens erecting her altars to unknown gods, we retreat to thoſe aſylums of ignorance, the *vis inſita*, the *vis nervea*, the *vis vitalis*, the *vis medicatrix*, and a number of others of the ſame kind.

10 and natural hiſtory.

Phyſiology, in the general ſenſe in which we have defined it, is a ſcience that inveſtigates the nature and the functions of all living beings. It is, therefore, reaſonable to ſuppoſe that it muſt have an intimate connection with natural hiſtory, and in fact, it is to this branch of phyſics that it has been perhaps more indebted than to any other. A comparative view of the various gradations among organized beings has taught us to appreciate the value of the ſeveral functions that characteriſe vitality, and has ſhewn us, that in proportion as the ſtructure is more complex, the functions are more numerous, and more complete. Repeated obſervations, and multiplied experiments on various tribes of animated nature have cleared up many doubtful and obſcure phenomena in the economy of man, and a continuation of this truly philoſophical method of reſearch promiſes to place phyſiology on the ſolid baſis of experience, and enable us to reaſon, where only we can reaſon with ſafety, by a deduction from facts. The more numerous theſe facts, and the more complete their arrangement, the more extenſive, and the more ſecure will be the foundation which they afford for phyſiological concluſions. In ſhort (to uſe the language of Dumas, who has illuſtrated this relation at great length), "the phyſiologiſt who is converſant with natural hiſtory, is ſo much the better fortified againſt uncertain opinions inaſmuch as he has more fully obſerved the operations of nature in connection and in detail. An hypotheſis which to others appears perfectly adequate to the object in view, is not convincing to him. He riſes above the particular object to which it is accommodated, in order to appreciate its value; and it is often among circumſtances which are foreign to the original ſubject, that he ſeeks for exceptions or contradictions that overturn the hypotheſis. Every thing that may ſerve to complete the knowledge of the animal economy enters into his plan; and as the nature of man is so much the less incomprehensible as we employ a greater number of comparative ideas in its expoſition, it is doubtleſs in the power of natural hiſtory to elucidate that ſubject, by revealing a multitude of unknown relations between man and thoſe beings which reſemble or which differ from him.*"

11 Importance and utility of physiology. The importance and utility of phyſiology will ſcarcely be queſtioned, and need therefore but little illustration. To all who deſire to become acquainted with the operations that take place in the animal economy, or to trace the progreſs of vegetation, and examine the various changes produced on the ſeed or bud from the action of air, heat, and moiſture, and what ſtudies can be more deſerving of a rational and an enlightened mind? phyſiology muſt afford the moſt intereſting ſubjects of contemplation. To the anatomiſt and the botaniſt, it relieves the tedium of dry deſcription and ſevere claſſification; to the phyſician it holds out the ſureſt lights to direct his reſearches into the circumſtances that are favourable to life and health, into the nature and phenomena of death, and of courſe, the means of avoiding or delaying its attack; to the agriculturiſt it furniſhes ſome of the moſt certain principles to direct him (with the aid of chemiſtry) in the choice of ſoils, and the application of manures; while to the genuine naturaliſt, no ſubject preſents ſuch a field of amuſement and inſtruction. When it ſhall have been rendered as complete as the ſtate of contemporary ſcience will allow, it will exhibit the general reſult of all thoſe experiments and obſervations that have purpoſely been made to illuſtrate the phenomena of animated matter, or have accidentally contributed to that illuſtration; and when it ſhall reach that ſummit of perfection to which the efforts of genius may carry it, it may diffuſe a light, of which at the preſent day we can form no juſt or adequate conception. On many occaſions it may introduce order for confuſion, certainty for doubt; and may eſtabliſh ſcience, in various departments that are now occupied by fancy and conjecture.

. After having pointed out the *nature*, *diviſions*, *relations*, and *utility* of phyſiology, it may not be improper to make a few remarks on the beſt methods of purſuing the ſtudy of it, and the works that are moſt worthy of a peruſal.

12 Methods of ſtudying phyſiology. From what has been ſaid of the relations between phyſiology and other ſciences, it will be inferred that the ſtudent of our preſent ſubject ſhould come prepared with a moderate ſhare of knowledge in anatomy, both human and comparative, of chemiſtry, of mechanical philoſophy, eſpecially dynamics, optics, pneumatics, and acouſtics; and natural hiſtory, eſpecially zoology and botany. At leaſt the *rudiments* of theſe branches ſhould be well underſtood, and the ſtudent will then have laid a foundation on which to raiſe a firm and durable ſuperſtructure.

He has now to make himſelf acquainted with what is already known; and in this inquiry it is of much conſequence that he ſhould ſelect thoſe works that embrace the whole ſubject, without being too diffuſe on the one hand or too brief and general on the other. The *Elementa Phyſiologiæ* of Haller contains a maſs of information that will ever render it valuable as a book of reference, though it will ſcarcely at the preſent day be ſtudied as a ſyſtem of phyſiology. His *Primæ Lineæ Phyſiologiæ*, though firſt written, is chiefly a compendium of the larger work, and is better adapted to the general ſtudent, though, from its not containing the later diſcoveries in the ſcience, it is far from complete. The *Inſtitutiones Phyſiologicæ* of Blumenbach is a uſeful work, though it has not given place to the later and more accurate [illegible] of Cuvier and Home. The *Leçons d'Anatomie Comparée* of the former writer contains an excellent digeſt of comparative phyſiology, and the preliminary obſervations prefixed to the anatomical details contained in this work, may be read with conſiderable advantage. Probably, however, the *Principes de Phyſiologie* of Dumas is the moſt perfect and ſcientific modern production that has appeared on the ſubject. We cannot ſay ſo much of the *Elements of Phyſiology* lately publiſhed by Richerand, and tranſlated into Engliſh by Mr Kerriſon; for although it contains conſiderable information, and a great diſplay of reading, and even of original obſervation and experiment, it is neither ſcientific nor always very accurate. The works of Bichat, eſpecially his *Anatomie Generale*, *Anatomie Deſcriptive*, and his *Recherches Phyſiologiques ſur la Vie et la Mort*, abound with excellent phyſiological remarks, and, allowing for the great extent to which he has carried ſome peculiar doctrines, are among the beſt that have appeared on the animal economy.

In our own country, we have many valuable treatiſes and papers on different parts of phyſiology, and the names of Hunter, Monro, Home, Cooper, Abernethy, Carliſle, Sanders, Barclay, Jones, and many others, will ever reflect honour on the country and on the age in which they lived. We can ſcarcely, however, point out a complete work in our language on the general ſubject of phyſiology, though we doubt not that many will be diſpoſed to conſider the *Zoonomia* of Dr Darwin as entitled to that appellation. We allow that this is a ſtupendous monument of the genius and induſtry of its author, and it contains an ample ſtore of valuable facts, which, if they could be diveſted of the hypotheſis with which they are ſo much blended, would be extremely uſeful to the cauſe of phyſiological ſcience. At preſent many of them tend to miſlead, by a ſhew of metaphyſical acuteneſs, and by the new ſenſe in which ſeveral terms are employed. Another of Dr Darwin's works, not leſs valuable, in a phyſiological point of view, is his *Phytologia*, in which he treats of the economy of vegetation with ability and ſucceſs.

13 Means of advancing and improving phyſiology. He who is deſirous of advancing and improving the ſcience of phyſiology, muſt, in the firſt place, have recourſe to a patient, and, as far as may be, an accurate obſervation of the phenomena that take place in organized beings; but the multitude, the variety, and complicated nature of theſe phenomena, place in his way obſtacles that it is difficult to ſurmount. It is only through time, and patience, and reflection, that he can attain his object; and it requires conſiderable dexterity and acuteneſs to detect the appearances under which theſe phenomena ſometimes preſent themſelves, to pierce through the obſcurity in which they are often involved, and to avoid, in a great meaſure, both the illuſions of ſenſe and the errors of genius. The living body has properties peculiar to itſelf, while it [illegible] of others that are common to it with brute matter. The phenomena by which it manifeſts these two orders of properties, are therefore of two kinds, [illegible]

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* *Dumas Principes de Phyſiologie*, tom. i. p. 231.

Introduction. larly to the ſtate of vitality, and as they are found in every object that exiſts. Theſe latter are ſubject to the general laws of matter, are confounded with the phenomena of univerſal nature, and may be denominated *phyſical phenomena*. Among the former, ſome are confined to the arrangement or diſpoſition of the parts in organs, and depend on the ſtructure or form of theſe organs. Theſe may be called *organic phenomena*. Others depend on the particular laws that govern vital beings, and are not the reſult of any peculiar organization; theſe are *vital phenomena*.

14 Obſervation. Obſervation alone is ſufficient to indicate the preſence or the exiſtence of theſe phenomena; but to unveil them fully there is required an unceaſing attention, that is reſolved to purſue them through the changes produced by age, ſex, climate, ſituation, and all thoſe circumſtances that can affect the living ſyſtem.

15 Experiment. To obſervation, he muſt add, wherever this can be done with a chance of accuracy, a patient inveſtigation of nature by experiment. From the experiments of Spallanzani and Stevens on digeſtion; of Goodwin, Menzies, Spallanzani, and Davy on reſpiration; of Monro, Galvani, Volta, and a hundred others on animal irritability, with many other experiments made both at home and abroad, more light has been thrown on the economy of living bodies, than by all the hypotheſes and theories that the moſt ingenious ſpeculatiſts have contrived ſince the firſt dawn of infant ſcience.

16 Cautions. In following out Bacon's great plan of obſervation and experiment, we muſt, however, take care in phyſiological, as in all other phyſical inquiries, not to be too haſty in our concluſions, and not to ſuppoſe that we have reached the bottom of the well of truth, when we have barely got within its verge. Further obſervations on this ſubject are unneceſſary here, as we have already treated it at ſome length in the articles PHILOSOPHY and PHYSICS.

17 Modern arrangements. We ſhall conclude theſe introductory remarks with a brief ſketch of the principal arrangements of modern phyſiologiſts, and a tabular outline of the ſubject as we propoſe to treat it in the following pages.

18 Two modes of arrangement. There are two modes of arrangement that have uſually been adopted in treating phyſiology; one according to the order of the functions, and another according to that of the organs by which theſe are performed. The latter of theſe was adopted by Haller; the former is that of Damas, Cuvier, and moſt of our later phyſiologiſts.

19 Arrangement of Dumas. Dumas, after a long introductory diſcourſe, in which he treats of the beſt method of purſuing the ſtudy of anatomy and phyſiology, divides his ſubject into ſix parts. In the firſt of theſe he offers ſome general views reſpecting anatomy, phyſiology, and all the branches of phyſics which are employed in illuſtrating the nature and properties of organized and living beings. In this part he gives a compendious hiſtory of the progreſſive improvements in anatomy and phyſiology, points out the relations that take place between theſe ſciences, and the auxiliary branches of mathematics, mechanical philoſophy, chemiſtry, and natural hiſtory; he conſiders the principal differences that diſtinguiſh organized from inorganic matter; the nature, effects, and duration of life, and of the general and particular powers or faculties of nature, both in living and brute matter.

In the ſecond part he lays down the fundamental principles on which the phyſical conſtitution and particular economy of man depend; treats of man conſidered individually; of his formation, ſtructure, and varieties; of the modifications produced in the nature of man by age, ſex, habit, and temperament: of the relations between man and external objects; of the action and reaction of the organic ſyſtems on each other; of the organic ſtructure of man, and of its ſeveral varieties in the different parts and organs; of the natural compoſition of the different fluids and ſolids of the human body: and gives a methodical diviſion of the functions, with a critical examination of the modes of claſſification commonly received.

In the third part he treats of the phenomena of the animal economy, in the relation which they bear to the perpetual commerce eſtabliſhed between man and the organs that ſurround him, or of *ſenſation* and *motion*. Here he conſiders the action of external objects upon man, whence reſult the phenomena of ſenſation, and the action of man on external objects, from which ariſe the phenomena of motion.

In the fourth part he treats of the phenomena of the animal economy, in the relation which they bear to the conſiſtence of the fluids, the coheſion of its ſolids, and the temperature of the whole ſyſtem. Here he conſiders the mutual action between the veſſels and the blood, from which reſult, both in the ſolids and fluids, that degree of coheſion and pliability that favours the neceſſary expanſibility of the living body, or the function of circulation; the action of the air, and of caloric, on the ſolids and fluids, from which reſults the degree of expanſion neceſſary to life, or the function of reſpiration.

In the fifth part he treats of the phenomena of the animal economy in the relation which they bear to the healthy and entire ſtate of the material ſubſtance and compoſition of the body. Here he conſiders the action of alimentary ſubſtances on the human body, in repairing its loſs, and preſerving its ſubſtance, from which reſult the phenomena of digeſtion, abſorption, and nutrition; and of the action of certain organs on the fluids of the body, in ſeparating thoſe which do not ſerve the purpoſes of nutrition, from which reſult the phenomena of ſecretion and excretion.

In the ſixth and laſt part, he treats of the phenomena of the animal economy in the relation which they bear to the commerce eſtabliſhed between the individual and the ſpecies. Here he conſiders the mutual phyſical action of the two ſexes, from which ariſe the phenomena of generation; and the mutual moral action of ſeveral individuals, from which reſult the phenomena of ſpeech, and mutual intelligence.

From this ſketch of the arrangement of Dumas it will be ſeen, that although he takes a very extenſive view of the ſubject, his obſervations are chiefly confined to the human body.

20 Arrangement of Cuvier. Though the lectures of Cuvier do not contain a complete ſyſtem of phyſiology, the anatomical matter in them is, however, ſo much blended with obſervations on the animal economy, that it will be of importance for the phyſiological ſtudent to be acquainted with his arrangement.

The whole work is divided into 30 lectures: the firſt of which is occupied with preliminary obſervations on the animal economy, comprehending a general view of the functions of animal bodies; a general idea of the organs of which the animal body is compoſed; a view of

Introduction. of the principal differences exhibited by theſe organs, and of the relations which exiſt among thoſe variations, together with a diviſion of animals founded on their organization. The ſecond lecture treats of the organs of motion in general; the third, fourth, fifth, and ſixth lectures are merely anatomical, exhibiting a comparative view of theſe organs in the ſeveral claſſes of animals. The ſeventh lecture is ſtrictly phyſiological, and treats of the organs of motion conſidered in the ſeveral actions of ſtanding, walking, ſeizing and climbing, leaping, ſwimming, and flying.

The eighth, ninth, tenth, eleventh, twelfth, thirteenth, fourteenth, and fifteenth lectures, are occupied in conſidering the anatomy and phyſiology of the function of ſenſation. Of theſe, part of the ninth treats of the nervous ſyſtem in general, and of its action; part of the twelfth gives the phyſiology of viſion; part of the thirteenth, that of hearing; part of the fourteenth, that of touch; and part of the fifteenth, that of ſmell and taſte.

The ſixteenth, ſeventeenth, eighteenth, nineteenth, twentieth, and twenty-firſt lectures treat of the organs and phenomena of digeſtion, maſtication, inſalivation, and deglutition. The twenty-ſecond lecture treats of what have been called the aſſiſtant chylopoietic viſcera, namely, the liver, the pancreas, the ſpleen, and their offices. The twenty-fourth treats of the organs and phenomena of circulation in general; the twenty-ſixth of thoſe of reſpiration in general; the twenty-eighth of the organs of voice.

The twenty-ninth treats of the organs and phenomena of generation, and the thirtieth, of thoſe of excretion, comprehending a general view, both of ſecretion and excretion.

21 Of Bichat. Subjoined to Bichat's introduction to his *Anatomie Generale*, there is a tabular view of phyſiology, in which, after ſome preliminary outline of the general ſtructure of the organs and of the phenomena of vitality, he divides the functions into claſſes, orders, and genera.

The firſt claſs conſiſts of the functions that relate to the individual; the firſt order of which, compriſing the functions of *animal life*, comprehends five genera, viz. *ſenſations*, *cerebral functions*, *locomotion*, *voice*, and *nervous tranſmiſſion*, beſides *ſleep*. The ſecond order of this claſs contains the functions of *organic life*, and comprehends eight genera, viz. *digeſtion*, *reſpiration*, *circulation*, *exhalation*, *abſorption*, *ſecretion*, *nutrition*, and *calorification*.

The ſecond claſs contains the functions that relate to the ſpecies in general, and is divided into three orders. The firſt of theſe, compriſing the functions peculiar to the male, comprehends only one genus, viz. the *production of the ſeminal fluid*. The ſecond compriſes the functions peculiar to the female, and contains three genera, viz. *menſtruation*, *the production of milk*, and *of the female generative fluids*. The third order compriſes the functions that relate to the union of the two ſexes, and the product of that union; and it comprehends alſo three genera, viz. *generation*, *geſtation*, and *delivery*.

Reſpecting the peculiar doctrines of this writer we ſhall ſpeak hereafter.

22 Zoological arrangement. There is ſtill another mode of arranging the phenomena of living bodies, that deſerves to be noticed, namely, that in which they are arranged according to the artificial ſyſtems of natural hiſtory. This mode of arrangement, though of infinite advantage to the zoologiſt, by ſhewing him at once the [illegible], and giving to his memory a power of [illegible] which it could not otherwiſe poſſeſs, is yet not ſuch as the phyſiologiſt would wiſh to be adopted. Zoological arrangements are [illegible] of the manners, diſpoſitions, and [illegible] of different animals; and all that part of the external economy which indicates ſomething of the wiſdom and deſign [illegible] by the Creator, in their ſtructure and adaptation to the modes of life which they are intended to purſue; but they do not ſufficiently illuſtrate the internal [illegible] on which this outward economy depends, nor do they ſufficiently explain the more ſecret functions, which being independent of the will of the creature, only diſplay the power and omniſcience of him who made it. This will be readily conceived from conſidering the difference between zoology and phyſiology, as we have defined it. Zoology is chiefly led to examine the animal kingdom as it uſually preſents itſelf to the eye, including a great variety of objects; phyſiology examines only that part of the animal economy which is principally made known by anatomy and chemiſtry. Zoology has been accuſtomed to divide its kingdom into ſo many claſſes or orders of animals; phyſiology would naturally divide its economy into ſo many functions. Zoology has uſually ſubdivided its claſſes by certain obvious external marks, as the teeth and claws; phyſiology would naturally ſubdivide its functions by the varieties of thoſe organs which are deſtined to perform them, as the ſeveral kinds of lungs and ſtomachs. Zoology mentions the functions only in a curſory manner, as forming a part of the hiſtory of animals; phyſiology takes notice of animals, only when they are of uſe to illuſtrate the functions. To theſe differences we may add another; that phyſiology, in the extended ſenſe which we have given it, goes beyond zoology in comprehending the economy of the vegetable creation. From this compariſon it will be admitted, that things which are primary in a zoological method, will often be ſecondary in a phyſiological arrangement, and *vice verſa*. This is very conſpicuouſly the caſe in one of the grand diviſions of Linnæus, viz. mammalia, where the important ſecretory organs of the milky fluid are noticed only like the colour of the hair, or the length of the tail, as a good outward mark of diſtinction, and likewiſe in the excellent table by D'Aubenton in his introductory view of natural hiſtory, in the *Encyclopédie Methodique*, in which the function of digeſtion is not even mentioned.

23 Utility [illegible]. It is, however, extremely uſeful, both to the naturaliſt and phyſiologiſt, that the arrangements of both ſciences ſhould be, as far as poſſible, adapted to each other, by marking the relative importance of the ſeveral functions in the various claſſes of living beings. This has been very ably performed by Vicq d'Azyr, a modification of whoſe table has been given in the comparative part of our ANATOMY. See Vol. II. p. 282.

24 With reſpect to all phyſiological arrangements we may obſerve, that as the phenomena of living beings are ſo intimately dependent on each other, as to form the links of one continued chain, it is of little conſequence which of the functions or phenomena we make the point from which we ſet out in our examination. But as the organs of ſenſation in moſt animals, and thoſe of digeſtion in almoſt all living creatures, are among the [illegible]

Introduction.

that are evolved, it appears most convenient to begin with one of these. The following is the arrangement that we shall adopt in the present article.

25 Arrangement [illegible]

After a very short sketch of the progress of physiological discoveries and opinions, we shall divide the remaining part of the article into 16 chapters. In the firſt of theſe we ſhall treat of the characteriſtic marks, general phenomena, duration, and principle of life. In the ſecond we ſhall conſider the phenomena of ſenſation, the action of the nervous ſyſtem, and the external ſenſes of feeling, taſting, ſmelling, hearing, and ſight. In the third and fourth chapters we ſhall treat of irritability, and the phenomena of motion. In the fifth we ſhall treat of digeſtion; in the ſixth of abſorption; in the ſeventh of circulation; in the eighth of reſpiration and voice; and in the ninth of nutrition, as completed by the ſucceſſive performance of the four preceding functions. In the tenth chapter we ſhall treat of the phenomena of ſecretion; and in the eleventh, of thoſe of excretion. In the twelfth we ſhall conſider the various means by which living beings defend themſelves from external injury, or the phenomena that attend the evolution and change of the integuments, to which function we ſhall give the name of *tegumation*. In the thirteenth chapter we ſhall conſider the transformations that take place in ſome tribes of living beings, eſpecially inſects and reptiles. In the fourteenth we ſhall briefly examine the phenomena of reproduction, and the hypotheſes to which they have given birth. In the fifteenth we ſhall conſider the nature of ſleep, and the phenomena of dreams; and in the ſixteenth we ſhall terminate our inquiries by a few obſervations on the nature and phenomena of death.

Introduction.

The following table is intended to exhibit an outline of the principal circumſtances attending the phenomena of life, in the order in which we have enumerated them.

26 Tabular outline.

1. LIFE—is either
   - Univerſally diffuſed through the body. *Polypi*, &c.
   - Moſt concentrated in certain organs.
   - Continued for only a few hours. *Ephemeræ, and ſome other inſects.*
   - ———— about a year. *Annual plants.*
   - ———— two years. *Biennial plants.*
   - ———— ſeveral years. *Perennial plants, and moſt animals.*
   - ———— about a century. *Elephants, pikes*, &c.
   - ———— ſeveral centuries. *Oaks, cheſnuts*, &c.

2. SENSIBILITY—Appears to
   - Exiſt in a very low degree in plants. *Senſitivity.*
   - Exiſts in a greater or leſs degree in all animals.
   - Confined to the ſenſes of feeling and taſte. *Moſt zoophytes.*
   - Extended beſides theſe to the ſenſes of ſmelling, ſight, and hearing.
   - Appears farther extended by an additional ſenſe. *Bats.*

3. IRRITABILITY—Affected by
   - Stimulants inviſible.
   - ———— unknown.
   - ———— unthought of.
   - The nervous influence.
   - Light.
   - Heat.
   - Moiſture.
   - Electricity.
   - Salts.
   - Gaſes.
   - Bodies that act mechanically.

4. MOTION—Performed by
   - Legs.
   - Wings.
   - Fins.
   - The tail.
   - Organs which fall not properly under theſe deſcriptions, *bats, flying opoſſums*, &c.
   - The ſpringineſs of the body or of ſome part of it, *maggots, fleas*, &c.
   - Contrivances which fit living bodies for being moved by foreign agents.

5. Digestion—
Performed by an alimentary canal.

Without teeth.
With teeth in the mouth.
———— in the ſtomach.
—— ſtones or artificial teeth in the ſtomach.
—— glands in the mouth for ſecreting a liquor to be mixed with the food.
—— pouches in the mouth where the food is kept and moiſtened.
—— a ſac or bag where the food is kept and moiſtened.
—— a membranous ſtomach.
—— a muſcular ſtomach.
—— an intermediate ſtomach.
Without a cœcum or blind gut.
With a cœcum.
—— two cœca.
—— three cœca.
—— four cœca.
These parts, as well as ruminating ſtomachs and their œſophaguſes, have antiperiſtaltic motions.
—— one entrance or mouth.
—— many entrances by abſorbents.
Plants have many alimentary canals.
Some polypes have alimentary canals that branch through the body.
The alimentary canals of plants and worms diſtribute the fluids without the aid of a circulating ſyſtem.

6. Absorption—
Performed by

Veſſels beginning from the alimentary canal.
———————— the cavities.
———————— the ſurface.
Veins in the penis and placenta.
Re-abſorbents originating from all the parts of the ſyſtem.

7. Circulation—
Performed by a ſyſtem with

One heart.
A heart for diſtributing the blood through the reſpiratory organs, and an artery for diſtributing it through the ſyſtem.
One heart for the reſpiratory organs, and one for the ſyſtem, both in one capſule.
Two hearts for the reſpiratory organs, and one for the ſyſtem.
A pulmonary heart, or a heart for the reſpiratory organs in the courſe of circulation.
A pulmonary heart within or without the courſe of circulation at pleaſure.
A heart ſituated in the breaſt.
———————— near to the head.
———————— in the oppoſite extremity.
Some animals and all plants have no circulating ſyſtem.

8. Respiration—
Performed by organs

Diffuſed through the ſyſtem.
Confined to one place.
Situated externally.
———— internally.
In the courſe of the circulation.
Not in the courſe of the circulation.
Within or without the courſe of circulation at pleaſure.
Without tracheæ.
With tracheæ ramified through the ſyſtem where the reſpiratory organs are generally diffuſed.
———————— not ramified through the ſyſtem where the reſpiratory organs are confined.
———————— formed by rings.
———————————— by ſegments of rings on one ſide, and a membrane on the other
———————————— by continuous rings running ſpirally like a ſcrew.
———————— admitting air by one entrance.
———————————————— by ſeveral entrances.
———————— wholly concealed in the body.
———————— partly projecting from the body.
———————————— opening at the head.
———————————————— at the oppoſite extremity.
———————————————— upon one ſide.
———————————————————— both ſides.

9. NUTRITION—Food prepared by
- The alimentary canal.
- The lacteals.
- The reſpiratory organs.
- The circulating ſyſtem.
- The cellular membrane.
- The glands.
- And by the ſeveral parts in which it becomes finally aſſimilated.

10. SECRETION—Performed by
- Veſſels.
- Exhaling veſſels.
- Excretory organs.
- Organic pores.
- Glands.
- And by all the parts of which the ſyſtem is compoſed.

11. EXCRETION—Excrementitious matters thrown out by
- The integuments chiefly.
- The common opening of the alimentary canal.
- Two openings of this tube.
- By the lungs and other emunctories.

12. INTEGUMATION—Some living bodies have integuments which are
- Scaly.
- Shelly.
- Membranous.
- Corneous.
- Cretaceous.
- Ligneous.
- Covered with down.
- ———— hair.
- ———— prickles.
- ———— feathers.
- ———— a viſcid matter.
- Change their colour.
- ——— their covering.
- Changed themſelves.

13. TRANSFORMATION—Takes place
- By a change of proportion among the parts.
- ———— of their form.
- — throwing off old parts.
- — an addition of new ones of a different uſe, ſtructure, and form.
- — a change of the whole form together.
- ———— of qualities, propenſities, manners.

14. GENERATION—Performed by
- The temporary union of two ſexes.
- The ſpontaneous ſeparation of parts.
- Organs ſituated in the breaſt.
- ———— in the ſide.
- ———— near to the head.
- ———— in the oppoſite extremity.
- An intrant organ of the male, and a recipient organ of the female.
- An intrant organ of the female, and a recipient organ of the male.
- The ſtamina and piſtils of flowers.
- The ſeminal ſecretion of the male thrown into the organs of the female.
- ———— ſprinkled at the entrance of the female organs.
- ———— thrown upon them from a diſtance.
- ———— tranſported to them by the winds.
- ———— ſprinkled on the embryo after emiſſion.
- ———— diſſolved in a fluid ſecreted by the female before it can rightly perform its office.
- ———— diſſolved perhaps ſometimes in air, as in the caſe of dioicous plants, where it probably acts like an aroma.

15. SLEEP—Natural ſleep is occaſioned by
- Quietneſs.
- The abſence of ſtimuli.
- The ſameneſs of ſtimuli when long continued.
- Deficient aſſimilation.
- Deficient irritability, which is owing ſometimes to the weakneſs, inattention, or confined powers of the mental principle.

16. DEATH. See LIFE.

HISTORY.

27 Utility of the hiſtory of phyſiology. THE early hiſtory of phyſiology can be little more than an account of the opinions of the ancient philoſophers reſpecting the nature and functions of the human body; but as their opinions reflect conſiderable light on the progreſſive improvement of the philoſophy of man, the hiſtory of phyſiology, even in its early ſtages, is curious and intereſting.

28 Opinions of Pythagoras reſpecting man. Of the origin of phyſiology as a ſcience we know nothing. On examining the writings of the earlieſt philoſophers, we meet with little more than a collection of abſtract principles and hypothetical reaſonings, eſpecially previous to Pythagoras. He conſidered man as a microcoſm, or an epitome of the univerſe, in which were produced the ſame phenomena as in the larger world, only to a leſs extent. He admitted more than one intelligent principle, conducting all the operations of the human body. He ſuppoſed that the human ſoul nouriſhed by the blood, fixed by the veins, the arteries, and the nerves, as ſo many viſible ſituations, became obedient to the general laws of univerſal harmony. He did not pretend that the eternal power of numbers had preſcribed all the phenomena of nature, and that the force of numerical harmonies regulated the motions of the bodies which filled the univerſe, though he has been made ſo to expreſs himſelf by his diſciples. He was contented with aſſerting, that every thing in nature was brought about according to the qualities and proportions of numbers, without attributing to them an intrinſic virtue and a poſitive exiſtence. He perceived that the phenomena of the animal economy ſucceeded each other with a ſtrict regularity, by which they concurred in maintaining order; and in this order he found the principle of the exiſtence and preſervation of all beings; a principle without which they could not exiſt. He conſidered the ſouls of men as emanations from the general ſoul of the univerſe, or *anima mundi*.

29 Of Alcmæon. Alcmæon conſidered the brain as the ſeat of the ſoul. He ſuppoſed ſound to be produced by the reverberation of the air within the cavity of the ear; and he thought that taſte was owing to the moiſture of the tongue. He compared the body of a fœtus to a ſponge, which obtained its nouriſhment by the ſuction eſtabliſhed over every part of its ſubſtance. According to him, the motion of the blood was the eſſential principle of life; and he ſuppoſed that the ſtagnation of this fluid in the veins produced ſleep, and its active expanſion brought back the waking ſtate of the body. Health conſiſted in the equilibrium and well proportioned mixture of certain primary qualities; and that whenever any of theſe became too predominant, diſeaſe was the conſequence.

30 Of Empedocles and Anaxagoras. Empedocles involved himſelf in a multitude of abſurd hypotheſes, in order to explain the formation of man, and the combination of the elements from which he was produced. He too, like the diſciples of Pythagoras, ſought among the properties of numbers, for the general principles both of phyſical and moral ſcience. In uniformity with this ſyſtem it was, that he reckoned the four elements, and admitted among the particles of theſe material principles a kind of affection and averſion, of deſire and antipathy, capable of ſeparating and reuniting them, as occaſion might require. He believed that reſpiration commenced within the *uterus*, where the infant was provided from each parent with certain organic particles, which tended to unite into one uniform whole. Anaxagoras, convinced that we muſt attribute the arrangement of matter to the intelligence of a ſuperintending being, imagined that the body of every animal was formed of homogeneous particles, which were brought together by a ſort of affinity. It appeared to him, that bodies which were endowed with thought, were compoſed of ſimilar elements, and theſe elements remained unalterable, and that no power in nature could exert any action on them.

31 Democritus. Democritus dedicated his life to repeated experiments on plants and animals. He explained the principal phenomena of organized bodies by the action and reaction of atoms, which he ſuppoſed to be endowed with powers eſſentially active, and ſuſceptible of repelling and attracting each other. According to him, generation conſiſted in the coheſion of homogeneous atoms. He conceived the heat inherent in the elements of the body to be the ſole active principle with which man was animated; and that by increaſe of this he became capable of life and motion. He compared the organs of the ſenſes to mirrors, on which were painted the images of things, and he reduced all ſenſations to the ſenſe of feeling, which he ſuppoſed to be more or leſs delicate according to circumſtances.

32 Hippocrates. Theſe philoſophers, who lived before the time of Hippocrates, had, as we ſee, but very rude and indiſtinct notions of the animal economy; nor were thoſe of the great father of phyſic much ſuperior. Excellent as was his practice, and acute his knowledge of the ſymptoms and progreſs of diſeaſes, the phyſiology of Hippocrates was very lame and defective. He ſeems, indeed, to have underſtood the function of nutrition better than moſt others; he traces the aliment into the ſtomach, ſeems aware of the proceſſes it has to undergo there, and hazards a conjecture that part of the chyle is taken up immediately by the pores of the cellular texture; and that the juices admitted into this membrane, ſerved for the production of milk, the matter of which is afterwards tranſported, and laid up within the breaſts. He attributes to each vital part an attractive force, which it exerts on the nutritious particles, in order to incorporate and appropriate to itſelf thoſe which bear to it a certain analogy. He thought that the heat generated in a living body was kept up entirely by the powers of vitality; and that the external air introduced by reſpiration, ſerved rather to check it, by exerting a cooling effect on the pulmonary organs. He repreſents the human body as agitated in all its parts by an alternate flux and reflux, which carried the matters from within outwards, or brought them from without inwards. From this ſome have ſuppoſed that he underſtood the circulation of the blood, a ſuppoſition made two hundred years ago, and lately again brought forward by the French phyſiologiſts. We ſhall not at preſent ſtay to examine this opinion, which, however, we conceive to be founded on very unſatisfactory arguments.

After Hippocrates, the ſcience of man was again left to the ſchools of philoſophy, from which he had firſt ſeparated it. Plato is the firſt philoſopher whoſe opinions merit particular notice. He wrote on the phyſiology of man, with his accuſtomed elegance and ſplendor of diction; and he aſſumed the tone of an inſpired prophet in deſcribing, with the force of eloquence, the grand images that ſuggeſted themſelves to his mind. Ariſtotle, cording to him, the human body does not contain within itſelf the cauſe of the phenomena which are the conſequence or the attendants of life. It is only a paſſive ſubject, on which the ſoul expreſſes the ſeries of its functions, like the canvas on which the painter traces the conceptions of his inventions. He diſtinguiſhes two principles of action in man, a rational ſoul, on which depend reflection and intelligence, and an irrational ſoul, on which depend life and motion. The latter is diffuſed through every part of the body; and it is by means of theſe parts that it feels, ſuffers pain, or enjoys pleaſure. Thus it is by means of the heart it is ſuſceptible of courage and of paſſion: by the liver of deſire. The head is the ſeat of reaſon; the cheſt, and eſpecially the heart, the ſeat of ſtrength and anger; the lungs, the general coolers of the body. One diviſion of the irrational ſoul, which poſſeſſes an appetite for food, and all the neceſſary refreſhments of the body, reſides in the epigaſtric region; which, in the language of Plato, is a ſort of ſtable, in which reſides a voracious animal. During nutrition, the vital parts aſſimilate to their ſubſtance the aliments which are preſented to them: and this aſſimilation is the conſequence of an affinity that takes place between theſe parts and the nutritious juices. He thus ſeems to regard nutrition as the effect of a combat between the aliments and the parts of the animal. A young animal will receive more nouriſhment than one which is old, becauſe the force of its body has more effect in overcoming the force of the nutritious ſubſtances.

As the reciprocal action of the ſoul and the body on each other did not appear to him capable of being explained on the ſuppoſition of immateriality, he propoſed the idea of a *plaſtic nature*, which he ſuppoſed to be an intermediate principle connecting the ſoul and the body.

The human body, which is entirely ſpongy, is expoſed through every part to oppoſite currents of air and fire, which traverſe and penetrate it, being introduced alternately by the lungs and by the ſkin. Hot, cold, denſe, rare, and the other ſenſible properties of bodies, are only the cauſes of the phenomena which we perceive, and are, as it were, the occaſions or accidents that are required to keep in play the intelligent force diſſeminated through nature.

34 Ariſtotle.

Ariſtotle, the diſciple of Plato, for a long time diſputed with him the palm of genius and celebrity; but, as his phyſiological doctrines differed very little from thoſe of his maſter, it is unneceſſary to detail them, except to remark, that he attributed to the ſoul three faculties, a *nutritive*, a *ſenſitive*, and a *rational* faculty; in the firſt of which life is the only principle; in the ſecond, feeling is produced; and the third is peculiar to man, and is that part of him which knows or judges. This part is either an active or a paſſive intellect, of which the firſt may be ſeparated from the body, and is immortal; whereas the ſecond periſhes together with the body. Life, according to this philoſopher, is a permanence of the ſoul, retained by the natural heat, the principle of which reſides in the heart.

About the period which we are now conſidering, philoſophy was divided into two ſects; the materialiſts, who attributed the formation of all beings to the fortuitous concourſe of atoms; and the ſpiritualiſts, who held that the ſoul enjoyed an exiſtence anterior to that of the body, which was no more than a paſſive organ, in which the phenomena that previouſly exiſted in the ſoul, in an abſtract, latent manner, became evident and ſenſible. To the former ſect belonged Democritus and Epicurus; to the latter, Zeno and Plato.

35 Herophilus.

The profeſſors of the Alexandrian ſchool, though they did much for the improvement of anatomy, added little to phyſiology. Of theſe Herophilus brought to ſome degree of perfection the doctrine of the pulſe, and ſeems to have underſtood the action of the pulmonary organs more correctly than his predeceſſors, attributing to them a ſort of natural appetite, by which they attracted and rejected the matter of reſpiration. He conſidered the nerves, the muſcles, and the arteries, as the moving powers of the body.

36 Galen.

In Galen, alſo a diſciple of this ſchool, we find the moſt ſkilful phyſiologiſt that has yet come under our notice. He ſeems firſt to have aſcertained by experiment, that the arteries contain blood, and not air, as had been the opinion of Herophilus and his predeceſſors; and that they poſſeſſed a moving force, independent of that which the heart exerciſes on the maſs of blood, and he found that the contraction of the heart always alternated with a proportional dilatation. He even tried ſome delicate experiments, in order to aſcertain the influence of the nervous ſyſtem upon the ſenſitive and motive powers of the body, by which he found, that when a nerve was intercepted with a ligature, the part to which it led became deprived of ſenſe and motion. He believed that the ſtomach, in a ſtate of contraction, applied itſelf to the aliment that had been taken in; that the meſenteric veins abſorbed a portion of the chyle prepared in the inteſtines; that the *ductus choledochus* carried the bile from the gall bladder into the duodenum; that the kidneys ſeparated a part of the urine; and he ſuppoſed, that another part of this fluid paſſed immediately from the ſtomach to the bladder, through ſome unknown paſſage. He believed that the lungs tranſmitted to the blood contained within them, an aerial principle, deſtined to free them from fuliginous vapours, and to temper the exceſs of heat generated within the body. The obſcure function of generation did not entirely eſcape his reſearches; and he made ſome curious attempts to find out how the ſexual organs prepared the ſeminal fluid, and how this acted in reproduction.

For more reſpecting the doctrines of Galen, ſee the Hiſtory of MEDICINE.

37 The chemiſts

The commencement of the 13th century is the epoch of a material revolution in phyſiology. Chemiſtry having penetrated into Europe, ſoon exerted its influence on moſt of the ſciences, and eſpecially on thoſe connected with medicine, the doctrines of which were totally changed from their ancient ſimplicity, and became a farrago of the moſt wild and fanciful opinions. The Peripatetics and the Galeniſts ſunk into oblivion; and the primitive qualities and occult faculties of the ancient ſchool gave way to the fermentations and effervefcences of the chemiſts. Albertus Magnus and Roger Bacon, when they introduced the ſcience of chemiſtry, ſcarcely dreamed of applying it to medicine; but Arnoldus de Villa Nova undertook this application, and ſought for the foundation of medical theory amid the proceſſes of his laboratory. Paracelſus followed, and ſurpaſſed him in this chemical delirium. An enlightened chemiſt and a credulous aſtrologer, his head burning with the fire of his furnaces, and his [illegible] filled with [illegible] reveries, he believed himſelf capable of conſtructing a new ſyſtem of pathology, from examining the courſe of the ſtars, and the products of his [illegible]. With the daring [illegible] of inſpiration, he declared man to be compounded of ſulphur, mercury, and [illegible]; and, having traced the origin of all diſeaſes to certain chemical operations, he flattered himſelf, that by means of his arcana he could preſerve health, and prolong, to an indefinite extent, the natural duration of human exiſtence.

38 Van Helmont.

Van Helmont, the diſciple of Paracelſus, not leſs fanciful, but more [illegible] than his maſter, ſaw the neceſſity of [illegible] more than [illegible] principles to explain the functions of the animal machine. He therefore [illegible] his archæus, an [illegible] being, who eſtabliſhed his throne in the epigaſtric region, having ſeveral [illegible] under him, who [illegible] over the [illegible] of the body, and [illegible] were, the [illegible], the [illegible], and the [illegible].

39 Des Cartes.

In the philoſophy of Des Cartes, the ſeparate exiſtence of the vital principle is entirely rejected. He availed himſelf of the progreſs that had been made by [illegible], and ſome other anatomiſts, in the inveſtigation of the nervous ſyſtem, to form an hypotheſis of the vital functions, founded on the ſuppoſition of the nervous fluid, or what was then called the [illegible]; and this nervous fluid was aſſumed independently of the ſenſitive ſoul, to explain the appearances of ſenſation and voluntary motion.

The diſcovery of the valves in the veins by Fabricius; of the lymphatics by Rudbeck and Bartholin; of the lacteals by Aſellius, and of the circulation of the blood by Harvey, all of which took place during the 17th century, gave to phyſiology an intereſt and a clearneſs which it never poſſeſſed before that period. Some account of the diſcoveries in the circulating and abſorbing ſyſtems, has been already given under ANATOMY; but as theſe diſcoveries have been productive of great advantages, both in general phyſiology, and in medicine, it will be worth while briefly to trace their origin and progreſs.

40 Diſcovery of the circulation.

To begin with the circulation of the blood. Hippocrates ſpeaks of the uſual and conſtant motion of the blood, of the veins and arteries as the fountains of human nature, as the rivers that water the whole body, and which if they be dried up, man dies. He ſays, that the blood-veſſels are, for this reaſon, everywhere diſperſed through the whole body; that they give ſpirits, moiſture, and motion; that they all ſpring from one; and that this one has no beginning and no end, for where there is a circle there is no beginning. In ſuch language was the prince of phyſicians accuſtomed to expreſs his vague ideas of a circulation; for ſo far was he from having acquired accurate conceptions on this ſubject, that when he ſaw the motions of the heart, he believed that the auricles were two bellows to draw in air, and to ventilate the blood.

When after his time anatomy came to be more ſtudied, the notions of the ancients reſpecting the blood were better defined; and, however chimerical they may ſeem to us, they were partly derived from diſſection and experiment. On opening dead bodies, they found that the arteries were almoſt empty, and that very nearly the [illegible] veins were diſtributed.

To this [illegible] dif[illegible] conveyed along with the air to the left ventricle to flow [illegible] reſult of mere ſpeculation. This notion was, that the left ventricle received air by the pulmonary vein; and [illegible]

The [illegible] tal work upon the ſtructure of the human body, and given [illegible] impoſſible that the blood could paſs through the ſeptum of the heart. His reaſoning rouſed the attention of anatomiſts; [illegible] paſſage which the blood muſt take in going from the right to the left ventricle. The diſcovery of this was firſt made by Michael Servede, a Spaniſh phyſician, who publiſhed his opinion in 1553. He [illegible], that the blood does not paſs through the ſeptum of the heart, as is commonly believed, but is conveyed by an admirable contrivance from the right ventricle of the heart, by a long paſſage through the lungs. This opinion was deemed heretic, and Servede's book was ſuppreſſed by public authority. Soon after, however, the ſame diſcovery was made by [illegible], an Italian profeſſor, who publiſhed his account in 1559. It farther appears, that Andreas Cæſalpinus, who publiſhed in 1571, and again in [illegible], was [illegible] only with the leſſer circulation, but obſerved, that the [illegible] and arteries [illegible] into each other, [illegible] ſert that the blood could not return by the arteries to the left ventricle of the heart. He did not, however, diſcover the true circulation, but moſt unaccountably maintained with Ariſtotle, of whom he was a zealous diſciple, that the blood flowed like the tides of Euripus, backward and forward in the ſame channel, and ſuppoſed that it flowed from the arteries into the veins during ſleep, and back again from the veins into the arteries till the waking ſtate.

In 1574, Hieronymus Fabricius ab Aquapendente, while he was ſeeking for a cauſe by which to explain the various ſwellings of ſome veins, which had ariſen from friction and ligature, he, to his great joy and aſtoniſhment, diſcovered their valves in one of his diſſections; and here again the true theory of circulation ſeemed almoſt unavoidable. Yet whoever reads the ſmall treatiſe De Venarum Oſtiolis, firſt printed by Fabricius in 1603, will ſoon perceive that he was as far from entertaining a juſt notion of the circulation as his predeceſſors. Notwithſtanding all that he ſaw, he ſtill was of opinion that the blood flowed from the heart to the extremities even in the veins. He thought that the valves were intended by nature only to check and moderate its force. He calls them an inſtance of admirable wiſdom, and miſtakes his own aukward conjecture for one of the deſigns of infinite intelligence. In another reſpect, it muſt be confeſſed that he bore no inconſiderable ſhare in promoting the diſcovery of the circulation. By writing on the valves, the formation of the fœtus, and chick in ovo, he directed the attention of his pupil Harvey to thoſe ſubjects where it was likely that the motion of the blood would frequently occur.

Harvey, who was born in 1578, and graduated at Padua in 1602, examined the valves with more accuracy than Fabricius, and explained their uſe in a treatiſe which he publiſhed ſoon after his graduation. In 1616, he taught the true doctrine of the circulation in his lectures, and publiſhed on the ſubject in 1628. He was the firſt author who ſpoke conſiſtently of the motion of the blood, and who, unbiaſſed by the doctrine of the ancients, drew rational concluſions from his experiments and obſervations. His books preſent us with many indications of a great mind, acute diſcernment, unwearied application, original remark, bold inquiry, and a clear, forcible, and manly reaſoning; and every one who conſiders the ſurpriſe which his doctrine occaſioned among the anatomiſts of thoſe days, the ſtrong oppoſition that it met with from ſome, and the numerous and powerful prejudices which it had to encounter from the ſanction of time and of great names, muſt allow it was new; and that the author has from its importance, a title to rank in the firſt claſs of eminent diſcoverers, ancient or modern.

We have been the more particular in tracing the progreſſive diſcovery of the circulation, and in attempting to ſhew that the real merit of the diſcovery is due to Harvey, becauſe both the abilities and the originality of this eminent man have been called in queſtion by his countryman Dr William Hunter; and many hints are given in the writings of ſome foreign phyſiologiſts, that the circulation was at leaſt gueſſed at by Hippocrates and other ancient writers.

We ſhall be leſs minute in tracing the diſcovery of the lymphatic ſyſtem, becauſe this has been related more at large in the article Anatomy.

41
Diſcovery of the abſorbent ſyſtem.

We learn from Galen, that certain veſſels had been ſeen in kids by Eraſiſtratus, which appear to have been lacteals, though he called them arteries. Theſe lacteals were, however, firſt accurately diſtinguiſhed in 1622, by Aſellius, who printed his account in 1627. In 1651, Pecquet publiſhed his account of the thoracic duct, which appears, however, to have been ſeen before by Euſtachius. In 1653, Bartholin publiſhed on the lymphatics, which had been ſome time before diſcovered by Rudbeck. In 1654, Gliſſon aſcribed to theſe veſſels the office of carrying back the lubricating lymph from the arteries into the blood, or conſidered them as abſorbents. In 1664, the valves of theſe veſſels were diſcovered by Swammerdam, and a year after, an account of them was given by Ruyſch. The farther diſcoveries of Nuck, Nouges, Warton, Steno, Hunter, Monro, Hewſon, Cruikſhank, Sheldon, Maſcagni, &c. have nearly completed our knowledge of the abſorbent ſyſtem, and its uſes.

In the latter end of the 17th century, ſome important diſcoveries were made on the ſubject of reſpiration, by our countryman Mayow; and theſe were ſupported by the obſervations of Lower, Verheyen, and Borelli. Theſe diſcoveries, however, lay dormant till they were brought into recollection a hundred years after in conſequence of the experiments of Prieſtley and Lavoiſier.

During the 17th century, conſiderable progreſs was made in completing the knowledge of the internal organs of generation. Much was done in this way by De Graaff and Malpighi, and Leuwenhoeck, the two latter of whom made ſeveral diſcoveries with the aſſiſtance of their microſcopes, though Leuwenhoeck founded on his obſervations a theory of generation which at this day appears not a little ridiculous.

42
Syſtem of Boerhaave.

The beginning of the 18th century is remarkable for the promulgation of a new phyſiological doctrine, founded on a miſtaken application of the circulation of the blood. We allude to the ſyſtem of Boerhaave. This great phyſician ſuppoſed that all the functions of the living body, excepting the will, are carried on by mechanical movements, ſuſceptible of rigid calculation, which neceſſarily ſucceed each other in the organs, from the time that life commences. Theſe movements are brought into action as ſoon as the animal begins to reſpire, and are the conſequence of an impulſive power in the heart, renewed by means of the influence of the nervous fluid brought from the brain. He conceived the living body to be merely a hydraulic machine, in which the heart performs the office of a piſton, and that the alternate contractions and dilatations that take place without intermiſſion in that organ, are owing to the alternately increaſed and diminiſhed compreſſion of the nerves that are diſtributed to the heart. When a contraction takes place, the blood fills the large arteries, and thus diſtends and compreſſes them; when the principal nerves of the heart, which paſs between theſe arteries, muſt of courſe become compreſſed, and thus their influence being diminiſhed, a relaxation takes place. But in proportion as the heart is relaxed, the large arteries become empty, and conſequently ceaſe to compreſs the nerves, which thus recovering their influence, reanimate the heart to a new contraction. Thus ſucceed each other without interruption the movements which form the mechanical principle of all the ſenſible motions that we obſerve in the animal machine.

Proceeding on these principles, Boerhaave conceived ſome very ſtrange notions reſpecting the conſtituent particles of the living fluids, to which he has no other [illegible] the globular form of their particles. He confined all the functions of the ſeveral organs to the operation of rounding into ſpheres the particles of the fluids which were preſented to them, or of preſerving that form in thoſe which they already contained. He thought that the lungs were chiefly of advantage, becauſe they contained within them a complete ſeries of veſſels, in which the particles of the blood can receive all thoſe dimenſions which may fit them to circulate through the reſt of the body. The [illegible] the velocity with which the fluids circulate through the ſecretory organs, conſtituted the principal difference in the nature of the ſecretions. Various orders of veſſels receive the blood and other fluids which paſs through theſe diviſions, ſubject to the laws of hydraulics; and when a fluid got by chance into an order of veſſels that was not fitted to receive it, ſome diſeaſe was the conſequence. Every thing in the animal machine was reduced to an aſſemblage of conduits, canals, cords, levers, pulleys, and other mechanical contrivances, put into action by mechanical means.

43 Mechanical.

This was conſidered the ſyſtem of mechanical phyſiology, which was begun ſome time before by Bellini and Borelli; and this ſyſtem maintained its ground in defiance of obſervation and common ſenſe, till about the middle of the 18th century. In the mean time, however, there aroſe two men, whoſe enlarged ideas and acute genius induced them to diſſent from the received opinions of the day, and to think for themſelves. Theſe were Hoffman and Stahl, who, though they [illegible] un-objectionable theories, contributed much to improve our ideas of the animal economy.

44 Syſtem of Hoffman.

Hoffman ſaw, that in the living body we ought not to ſeparate the principle of vitality from the general properties of matter. He [illegible] that this principle, ſuſceptible in itſelf of activity and motion, was ſufficient for all the operations and all the functions of the body when it [illegible], in his eyes, [illegible], formed of tubes and canals, differing only in ſize, form, elaſticity and force. He ſaw, that if the ſolids act upon the fluids, theſe muſt, in their turn, react upon the ſolids; and that life could only be [illegible] action and reaction. The eſſential cauſe of life, according to Hoffman, is the progreſſive motion of the blood, occaſioned by the impulſe of the heart, and kept up by the alternate contractions and dilatations of the veſſels. Theſe contractions and dilatations are the conſequence of the force of an elaſticity inherent in the vaſcular fibres, and this force is ſtill farther promoted by the [illegible], which is ſuch that they can be penetrated by the blood and the nervous fluid. This laſt fluid he imagined to be compoſed of [illegible] in a certain portion of a very pure ſubtile lymph, that ſerved them as a vehicle. By this fluid the [illegible] of the nerves [illegible], which reſides [illegible]. Thus, all the functions, [illegible] principle, are the effects of phyſical powers, which mechaniſm has, however, [illegible] more ſubtile and more exalted with reſpect to the [illegible] operations [illegible]. If all the nerves, [illegible], and membranes [illegible] preſerve a moderate degree of tenſion, and a [illegible] ſtate of tenſion and relaxation, the fluids are [illegible] to [illegible], and produce a proper equilibrium in the ſyſtem. In this ſtate, all the operations of the body and mind take place with proper regularity; and this happy harmony, by aſſuring to the animal the entire plenitude of its exiſtence, becomes the foundation of health. This degree of moderate tenſion is always more or leſs altered in a ſtate of diſeaſe.

45 [illegible]

Little ſatisfied with all the theories founded on a groſs mechaniſm, and convinced of their inſufficiency to explain the phenomena of vitality, Stahl admitted forces that were [illegible], but that were [illegible] principle which [illegible] them to their deſtined uſes, and which, by diſtributing them with a wiſe economy, proportions or accommodates them to the different occaſions of the individual. His [illegible] writer who has treated the ſcience of man on a general plan, and according to a philoſophical arrangement; and as his doctrine has ſtill numerous advocates in the medical ſchools of France, we ſhall be ſomewhat more particular on it than on that of Hoffman.

In determining the limits between medicine and the other phyſical ſciences, Stahl commences with ſeparating from the former all thoſe principles which, though true in themſelves, have no relation to the nature of that ſcience, which he conſiders as originating in obſervation alone. The knowledge of the phyſical ſtate of the animal body cannot, he thinks, throw any light, either on the [illegible], or [illegible] of [illegible]. Conſequently it is of little uſe in medicine, and has no right to govern an art, the object of which is, to remedy thoſe injuries that threaten the human body. He proves that living bodies are freed from the neceſſary laws of mechanics, becauſe all [illegible] embraces the whole chain of the movements eſſential to life, and the means eſtabliſhed for its preſervation. The human body, [illegible] and vital powers, tends naturally to ſelf-deſtruction; but, on the other hand, the organic ſtructure to which is attached the exerciſe of the actions peculiar to the human ſpecies, is founded on this mixture. It is therefore neceſſary that the body ſhould be in a ſtate of reſiſting this tendency, in order that it may be ſuſtained; and as the corruptibility inherent in its nature, purſues it through every period of its exiſtence, [illegible] ſary to prevent the corruption from taking place, muſt [illegible]. It is this preſerving action that conſtitutes the eſſence of life.

The preſervation of the body is indeed effected by a ſort of [illegible] organs as its [illegible], and it [illegible] effects. Health is the reſult of that [illegible] of the organs [illegible] to [illegible].

[illegible] to [illegible], [illegible] intelligent and wiſe principle, [illegible] in the [illegible] of organized bodies [illegible] the manner moſt favourable to the end which it propoſes. A ſpeculative metaphyſician, accuſtomed to wander over the field of abſtraction, to enlarge the ſphere of his intellectual notions, to transform ſenſible objects into ideas, this author could never perſuade himſelf that a being could not proportion and adapt its organs to the operations they are to perform, without poſſeſſing a knowledge of theſe operations, and having already exerciſed a judgment with reſpect to them. It is from this that he confounds the principle of life with the thinking ſoul, which being inceſſantly preſent in every part of the body, directs and diſpoſes them according to its own views, and to the end that it propoſes in the continual developement of the actions it is to conduct.

The formation, the ſtructure, duration and movements of the body, do not belong peculiarly to it, as it is only a paſſive ſubject on which the ſoul impreſſes and realiſes the idea of the phenomena that ſhe has conceived. Every thing is derived from the union of the body with the active foreſeeing principle, which governs, according to ſpecial laws, thoſe phenomena which are more particularly vital, and which are moſt independent of the will. The immediate action of this latter faculty does not require the aſſiſtance of any other ſubſtance. The intervention of an intermediate principle would be there ſuperfluous; and Stahl rejects that of the animal ſpirits, which had been introduced to explain the mechaniſm of vitality, and which, by overcharging the ſcience, embarraſſes it with a uſeleſs hypotheſis.

Two faculties are ſufficient for the ſoul to act upon the body, and to preſerve it in a living ſtate, viz. thoſe of ſenſe and motion. By the former the animal learns to know the properties of the objects by which he is ſurrounded, or in which he is intereſted, and to eſtimate the relations that ſubſiſt between theſe objects and himſelf; the latter produces the motion of the whole machine, and determines all the changes of ſituation which it has to undergo in its whole, and in its parts.

The faculty of ſenſation has two modifications, relative to the two kinds of knowledge which the ſoul may receive by means of that function. The firſt of theſe reſides in the organs of ſenſe, and is adapted to external objects; the ſecond eſtabliſhes its ſeat in the interior organs, and refers to objects that are within, or ideas. Sometimes the moving power enveloped in the muſcular ſyſtem is diſplayed by the ſenſible actions that regulate the poſition of the body with reſpect to the objects of the univerſe, of which it makes a part; ſometimes concentrated within theſe organs, it excites inteſtinal motions, which maintain among their conſtituent parts, thoſe relations, and that equilibrium, which are neceſſary to preſerve the healthy ſtate, conſiſtence, and tone of each organ. The muſcular apparatus is ſubſervient to the exerciſe of the ſenſes; and the different motions which it impreſſes on the body, for the purpoſe of tranſporting it towards, or to a diſtance from, certain objects, are always determined by the convenience or inconvenience which the body, by means of the ſenſes, experiences from thoſe objects. The tonic motion, determined by the confuſed ideas of the principle of life, is diſplayed in the moſt hidden organic parts, in the moſt perfect repoſe and profound ſilence of the voluntary movements.

The ſoul gives to its organs the diſpoſition that is favourable to the ſenſations it wiſhes to receive, by virtue of the judgement that it exerts reſpecting theſe ſenſations, before it has experienced them. This judgement is exerted on the relations between the objects that excite theſe impreſſions, and the actual ſtate of the body; and it is the intuitive knowledge of theſe relations that determines, in all their infinitely diverſified ſhades, the pleaſure or the pain which the animal experiences from the objects that ſurround it.

Stahl regards the excretions as the means employed by nature to counteract the natural tendency of the body towards putrefaction. He believes that the animal humours are exceedingly diſpoſed to thicken, and that the circulation of the blood is the means made uſe by nature to keep up their original fluidity. One of the cauſes that moſt favour the tendency of the humours to putrefaction, is *plethora*, to which nature oppoſes, ſometimes the motion of the ſolids that diſtribute the blood; ſometimes the hemorrhagic fluxes which unload the vaſcular ſyſtem. Theſe latter opinions are the principal foundations of what has been called the *humoral pathology*, which prevailed ſo long in moſt of our medical ſchools, and which, with certain modifications is ſtill maintained in many parts of the continent.

46
Of Haller.

The favourable impulſe given to phyſical ſcience in general, by the philoſophical writings of Bacon and Newton, extended itſelf at length to phyſiology; and phyſiological writers became convinced that it was better to collect and arrange the facts that related to the economy of living beings, than to frame hypothetical ſyſtems concerning them. The honour of forming a rational digeſt of the phenomena of the animal economy was reſerved for Haller, who perceived the importance of aſſembling under one view, the experiments, facts, and obſervations of preceding writers, and of ſubſtituting them in the place of hypothetical reaſonings. He traced the plan of the immenſe edifice that he deſigned to conſtruct in his *Firſt Lines of Phyſiology*, and executed it on a grand and extenſive ſcale, in his *Elements*, in which he has brought together into a body of doctrine, as complete as could be expected in his time, all the materials of the ſcience. He perceived the inconvenience of a too ſtrict application of the laws of mechanical philoſophy to the living ſyſtem. He admitted an active force, which he conſidered as peculiar to the animal body, viz. irritability, which contains the reaſon or the experimental cauſe of muſcular motion. He maintained that irritability ſhould never be confounded with ſenſibility, and that the irritable fibre differs as much from the ſenſible fibre, as the function of motion from that of ſenſation. Laſtly, in his *Opera Minora*, he lays down many new and important points of doctrine reſpecting the ſtructure of our organs, and the mechaniſm of our functions; and he relates a number of experiments made on living animals, for the purpoſe of drawing from nature the ſecret of thoſe phenomena which ſhe appears moſt deſirous to conceal. We owe to Haller ſome curious reſearches reſpecting the formation of bone, and the production of callus, as well as ſome important elucidations of the manner in which the embryo contained in the egg is developed, and paſſes through the ſucceſſive ſtages of its organization. He has left us many experiments and details reſpecting the ſtructure of the heart, the circulation of the blood, and the pulſation of the arteries; on the mechaniſm of the ribs, and the action of the intercoſtal muſcles during reſpiration; on the differences between the ſenſible and irritable organs; on the action of the brain and nerves, &c.

The latter half of the 18th century is remarkable for many able phyſiologiſts, who will be admired by poſterity, either for the acuteneſs of their genius, or the important improvements that they have made in the ſcience. We may mention the names of Bordeu, La Caze, Bonnet, Vicq d'Azyr, Bichat, Dumas, and Cuvier in France; of Fontana and Spallanzani in Italy, and of Whytt, Cullen, Brown, and Darwin in Britain. We cannot pretend to enumerate all the opinions and diſcoveries of theſe celebrated men, but muſt content ourſelves with giving a ſketch of the three rival ſyſtems of Cullen, Brown, and Darwin, and a brief outline of the opinions of Bichat.

47
Of Cullen.

The phyſiological ſyſtem of Cullen was founded chiefly on that of Hoffman. He placed the principle of the whole animal economy in the movement of the vital ſolids, regulated by the fundamental laws of the nervous ſyſtem. This notion of the vital ſolids, according to him, originates in the nerves, and being almoſt always united in the *ſenſorium*, is eaſily tranſmitted from one nervous part to another, as long as the medullary ſubſtance of the nerves continues in its natural ſtate of life and continuity. The contraction of the moving fibres connected with the ſenſible organs through the medium of the brain, is the direct effect of a movement that commences with thoſe objects. It is on the contractility inherent in the moving fibres, excited by their own extenſion, by the application of various ſtimuli, and often by the immediate influence of the animal or nervous powers, that all the phyſical actions of a living being depend. He regards this contractile force as diſtinct from all thoſe which are poſſeſſed by the ſimple ſolid, and the inorganic elaſtic parts of the body.

Of the theory of Brown, we have given a ſufficient detail under his life, and need not repeat it here.

48
Of Darwin.

It is not eaſy to give a compendious view of the ſyſtem of Dr Darwin, that ſhall be intelligible to thoſe who have not examined his celebrated work, the Zoonomia; but we ſhall endeavour to give as brief and perſpicuous an account of it as poſſible. It is neceſſary firſt to notice the deſcriptions given of the terms to be employed, which are as follows.

The immediate organs of ſenſe are, by Dr Darwin, aſſerted to conſiſt, like the muſcles, of moving fibres. The contractions of the muſcles and of the organs of ſenſe, are comprehended under what are called *fibrous motions*, in contradiſtinction to the *ſenſorial motions*, or the changes which occaſionally take place in the *ſenſorium*. By this latter term is underſtood, not only the *medulla* of the brain and nerves, but alſo at the ſame time that living principle or *ſpirit of animation*, which reſides throughout the body, and which we perceive only in its effects. An idea is defined to be a motion of the fibres of ſome immediate organ of ſenſe; and hence is frequently termed alſo a *ſenſual motion*. Perception comprehends both the fibrous motion or idea, and the attention to it. When the pain or pleaſure ariſing from this motion and this attention produces other fibrous motion, it is termed *ſenſation*; thus limiting this term to an active ſenſe. Ideas, not immediately excited by external objects, but which recur without them, are termed either, 1. Ideas of *recollection*, as when we will to repeat the alphabet backwards; or 2. Ideas of *ſuggeſtion*, as when we repeat it forwards, A ſuggeſting B. B ſuggeſting C, &c. from habit.

After mentioning a number of experiments to prove the fibrous motions of the organs of ſenſe, Dr Darwin proceeds to lay down the following laws of animal cauſation.

1. The fibres which conſtitute the muſcles, and organs of ſenſe, poſſeſs a power of contraction. The circumſtances attending the exertion of this power of *contraction* conſtitute the laws of *animal* motion, as the circumſtances attending the exertion of the power of attraction conſtitute the laws of *inanimate* matter.

2. The *ſpirit of animation* is the *immediate* cauſe of the contraction of animal fibres. It reſides in the brain and nerves, and is liable to general or *partial* diminution or accumulation.

3. The ſtimulus of bodies external to the moving organ is the *remote* cauſe of the original contractions of animal fibres.

4. A certain quantity of ſtimulus produces *irritation*, which is an exertion of the ſpirit of animation exciting the fibres to contraction.

5. A certain quantity of contraction of animal fibres, if it be perceived at all, produces *pleaſure*; a greater or leſs quantity of contraction, if it be perceived at all, produces *pain*. Theſe conſtitute *ſenſation*.

6. A certain quantity of ſenſation produces *deſire* or *averſion*. Theſe conſtitute *volition*.

7. All animal motions which have occurred at the ſame time or in immediate ſucceſſion, become ſo connected, that when one of them is reproduced, others have a tendency to accompany or ſucceed it. When fibrous contractions ſucceed or accompany other fibrous contractions, the connection is termed *aſſociation*; when fibrous contractions ſucceed ſenſorial motions, the connection is termed *cauſation*; when fibrous and ſenſorial motions reciprocally introduce each other, it is termed *catenation of animal motions*. All theſe connections are ſaid to be produced by habit; that is, by frequent repetition. Theſe laws of animal cauſation are, according to our author, evinced by numerous facts, which occur in our daily exertions, and are employed by him to explain the diſeaſes and decay of the animal ſyſtem.

The four *ſenſorial powers*, upon which all the actions or motions depend, are thus characterized:

Irritation is an exertion or change of ſome extreme part of the ſenſorium, preſiding in the muſcles or organs of ſenſe, in conſequence of the appulſes of external bodies.

Senſation, is an exertion or change of the central parts of the ſenſorium, or the whole of it, beginning in ſome of thoſe extreme parts of it, which reſide in the muſcles or organs of ſenſe.

Volition is an exertion or change of the central parts of the ſenſorium, or of the whole of it, terminating in ſome of thoſe extreme parts of it which reſide in the muſcles or organs of ſenſe.

Aſſociation is an exertion or change of ſome extreme part of the ſenſorium, reſiding in the muſcles or organs of ſenſe, in conſequence of ſome antecedent or attendant fibrous contractions.

To theſe four faculties correſpond ſo many claſſes of fibrous contractions, named *irritative*, *ſenſitive*, *voluntary*, and *aſſociate*. But all muſcular motions, and all ideas, are originally irritative, and become connected with ſenſation and volition from habit, i. e. becauſe *pleaſure* or *pain*, or *deſire* or *averſion*, have accompanied them;

those ideas or muscular motions which have been frequently excited together, ever afterwards have a tendency to accompany each other.

Of these motions the *associate* seem most to have excited Dr Darwin's attention. He divides them into three kinds; *irritative associations*, as when any part of the excised heart of a frog is irritated by puncture, the whole heart contracts regularly; *sensitive associations*, or the trains or tribes of motions established by pain or pleasure; and *voluntary associations*, or those produced by volition.

The activity of this power of volition is supposed to form the great difference between man and the brute creation; the means of producing pleasure and avoiding pain given to man by this power being denied to brutes.

Correſponding to theſe four claſſes of motions, there are four claſſes of ideas; *irritative*, preceded by irritation; *ſenſitive*, preceded by the ſenſation of pleaſure or pain; *voluntary*, preceded by voluntary exertion; and *aſſociate*, preceded by other ideas or muſcular motions.

It has been obſerved in Hudibras that

> "———A rhetorician's rules
> Serve nothing but to name his tools."

So we find that a conſiderable part of Darwin's work is taken up in eſtabliſhing the new meaning which he attaches to terms well underſtood and long adopted.

We cannot enter more fully at preſent into the opinions of the Zoonomia, but we ſhall have occaſion to notice ſome of them in the ſucceeding part of this article.

49
Opinions and arrangement of Bichat.

Bichat's ſyſtem, which has made ſo much noiſe on the continent, is chiefly founded on the diviſion of life into two kinds, *organic* and *animal*; the former of which is common to all organized beings, while the latter, as its name imports, is peculiar to animals. Each of theſe two kinds of life may be conſidered as compoſed of two orders of functions, which ſucceed each other in an inverſe order. The firſt of theſe ſeries in *animal life* commences with external objects, and proceeds towards the brain; the ſecond begins in the brain, and is thence propagated to the organs of motion and voice. In the firſt order of functions, the animal is paſſive; in the ſecond he is active. External objects act on the body through the medium of the firſt; by the ſecond, the body reacts on external objects.

Two kinds of motion take place in *organic life*. In the firſt the formation of the body is conſtantly going on; in the ſecond there is a conſtant decompoſition: hence the elements of the body are continually changing, while the organization continues the ſame. Organic life is accommodated to the continual circulation of matter. The one order of functions aſſimilates to the nature of the animal, the nutritious particles received into the ſyſtem; the other rejects what is uſeleſs, or is ſo much altered as to become noxious. The aſſimilating order of functions conſiſts of digeſtion, circulation, reſpiration, and nutrition; all of which proceſſes the matter received into the body muſt undergo, before it can become a part of the animal ſubſtance. When it has for ſome time conſtituted a part of the body, it is taken up by abſorption, conveyed into the circulation, and thrown out thence, by cutaneous or pulmonary exhalation, or by ſome other emunctories. Hence, the ſecond order of organic functions, or diſaſſimilating functions, conſiſt of abſorption, circulation, exhalation, ſecretion, and excretion. The *brain* is the centre of *animal life*; the *heart* of *organic life*.

Bichat conſiders the proper balance of life to be preſerved by the proportion which exiſts between the action of ſurrounding bodies, and the reaction of the ſyſtem. This reaction is greateſt in youth, hence the principle of life is at that time in exceſs. It is leaſt in old age, and then the vital principle is defective. The meaſure of life is therefore the difference which exiſts between the efforts of external powers to overturn life, and the internal reſiſtance to ſupport it. The exceſs of the former ſhows the weakneſs of life; that of the latter indicates its ſtrength.

The following table exhibits Bichat's diſtribution of the organs, or, as he calls them, *appareils*, belonging to *animal* and *organic life*, and to *generation*, which is common to both.

I. ORGANS OF ANIMAL LIFE.

ORGANS	1. *Locomotive*,	including	1. The bones and their dependances. 2. The muſcles and their dependances.
	2. *Vocal*, including the larynx and its dependances.		
	3. *External ſenſitive*,	including	1. The eye. 2. The ear. 3. The noſtrils. 4. The tongue. 5. The ſkin and its dependances.
	4. *Internal ſenſitive*,	including	1. The brain and its membranes. 2. The ſpinal marrow and its membranes.
	5. *Conducting ſenſation and motion*,	including	1. The cerebral nerves. 2. The nerves of the *ganglia*.

ORGANS

II. Organs of Organic Life.

Organs	1. *Digeſtive,*	including	1. The mouth. 2. The pharynx and œſophagus. 3. The ſtomach. 4. The ſmall inteſtines. 5. The large inteſtines. 6. The *peritonæum* and *epiploon*.
	2. *Reſpiratory,*	including	1. The *trachea*. 2. The lungs and their membranes.
	3. *Circulatory,*	including	1. The heart and its membranes. 2. The arteries. 3. The veins of the general ſyſtem. 4. The veins of the abdominal ſyſtem.
	4. *Abſorbent,*	including	1. The abſorbent glands. 2. The abſorbent veſſels.
	5. *Secretory,*	including	1. The lachrymal ducts. 2. The ſalivary and pancreatic ducts. 3. The biliary and hepatic ducts. 4. The urinary paſſages.

III. Organs of Generation.

Organs	1. *Male.*		
	2. *Female.*		
	3. *[illegible]*	including	1. The membranes and placenta. 2. The fœtus.

52
Recapitulation.

We have now taken ſuch a view of the progreſſive ſtate of phyſiological ſcience, as we deemed conſiſtent with the nature and extent of this article. It has taught us that the prevailing ſpirit of every age has had a marked influence on the productions both of art and ſcience that have appeared during that period; and that phyſiology has always been intimately connected with the character of the ſcience that was moſt prevalent at any particular period. While the doctrines of Ariſtotle prevailed in the ſchools, phyſiology never extended beyond the bounds that had been ſet to it by Galen; and the belief in occult qualities univerſally prevailed. When a taſte for metaphyſical ſpeculations began to gain ground, this ſcience was given over to the moſt abſtract ſubtilities and abſurd notions. When Des Cartes had reformed the principles of the ancient philoſophy, the ſtudy of the animal economy, like all the other branches of phyſics, was fettered by the trammels of the Carteſian doctrines. After the genius of philoſophers was directed to chemiſtry, phyſiology alſo took a chemical turn, which it quitted only to take a new direction pointed out to it by the taſte for mathematics and mechanical philoſophy, which prevailed among all the literary at the end of the 17th and beginning of the 18th century; and now that the ſtudy of chemiſtry is become ſo general, we ſee that phyſiologiſts are for reducing the functions of the animal economy to the analytical and ſynthetical operations of the laboratory, and converting the living body into a furnace where a conſtant combuſtion is going on while life remains.

We are now to enter on the phenomena of life, and the functions of organized beings; and here we muſt premiſe, that in our illuſtration of theſe phenomena and functions we ſhall occaſionally refer to every claſs of living creatures; it being our deſign rather to give a comparative view of phyſiology in general, than to confine our remarks to the human economy in particular. Indeed much of the phyſiology of man has already been given under ANATOMY and MEDICINE; and of that of the inferior animals, we have treated of the phyſiology of the order *Cete* under CETOLOGY; of that of *Inſects* under ENTOMOLOGY; of that of *Fiſhes* under ICHTHYOLOGY; of that of *Serpents* under OPHIOLOGY.

Chap. I. *Of the General Phenomena of Life.*

General idea of life.

When we take a general view of the objects of nature, we ſee that they differ from each other in many important particulars, and we ſoon find that they may be conveniently divided into two great claſſes; one capable of growth, nouriſhment, and reproduction; the other not ſuſceptible of theſe changes. We perceive that all thoſe ſubſtances which are found in the bowels of the earth, and many of thoſe which appear upon its ſurface, continue for an indefinite time in the ſame circumſtances, until they are acted on by each other, when they undergo certain changes which entirely alter their nature and former properties.

Sulphur, in its natural ſtate, is a ſolid ſubſtance inſoluble in water, and poſſeſſing but little activity when applied to the human ſkin; but if it be ſubjected to the action of heat, in contact with atmoſpheric air, or any other gas containing oxygen, it becomes a fluid, very miſcible with water, and of a moſt corroſive quality, namely ſulphuric acid. The hydrogenous gas found in the upper part of mines, would remain for ever uncombined with the oxygenous gas which forms part of the atmoſphere in which it floats, were it not ſubjected to the action of caloric, or electricity in a very concentrated ſtate; but as ſoon as either of theſe agents comes in contact with the mechanical mixture of gaſes, a combination takes place, attended with a tremendous exploſion, and the hydrogenous gas diſappears.

52 Diſtinction between organized and inorganic matter.

We find that all the bodies to which we give the name of minerals, poſſeſs no power in themſelves which can enable them to reſiſt the operation of external agents; each individual of them is compoſed of a ſmall number of principles, and their texture appears to be made up of independent particles. Every other body in nature, comprehending the almoſt infinite variety of plants and animals, though under certain circumſtances ſubject to the ſame changes which take place among minerals, have, when theſe circumſtances do not exiſt, an innate property by which they are enabled to reſiſt the production of theſe changes. They do indeed undergo certain alterations, but by theſe their original habit and eſſential properties are not changed. From the time that a plant ſprings from the ſeed, till it ceaſes to vegetate, it is perpetually receiving an acceſſion of new matter, and giving out a part of its former compoſition: but the new matter is aſſimilated to it, and becomes a part of the plant; the identity of the plant is preſerved, though its component parts are perpetually changing. The ſame in a ſtill higher degree takes place in animals. The individuals of this latter claſs, comprehending plants and animals, poſſeſs peculiar ſtructure, very different from that of the former. Their texture is fibrous, and the fibres arranged and interwoven, ſo as to form parts called organs, by means of which they carry on certain operations or *functions* neceſſary for their preſervation, or for the reproduction of the ſpecies. Hence theſe have been called *organized* bodies, while the others have been denominated *brute* or *inorganic* matter. See *NATURAL Hiſtory*, Nº 7.

The component principles of organized beings are much more numerous in each individual than thoſe of inorganic matter, though their abſolute number in the former claſs is ſmaller than in the latter. In order to preſent, under a compendious point of view, the diſtinguiſhing characteriſtics of theſe two claſſes of beings, we ſhall give the following table.

The phenomena of inorganic matter are	Mobility, Repoſe, Aggregation, Coheſion, Gravitation, Condenſation, Dilatation, Combination, Diſſolution.	Reſolvable into	Inertia, Impulſion, Attraction, Affinity.
The phenomena of organized matter, beſides thoſe of inorganic matter are,	Impreſſion, Senſation, Perception, Affection, Sympathy, Action, Locomotion, Digeſtion, Circulation, Reſpiration, Aſſimilation, Accretion, Reproduction.	Reſolvable into four general forces,	Senſitive, Motive, Aſſimilative, and Vital reſiſtance.
The properties of inorganic matter are,	Extenſion, Gravity, Hardneſs, Elaſticity, Fluidity, Impenetrability, Diviſibility, Expanſibility, Permeability, Figurability.	The variations or degrees of which diſtinguiſh	Cryſtals, Salts, Metals, Stones, Foſſils.
The properties of organized matter, beſides thoſe of inorganic matter are	Regularity, Individuality, Spontaneity, Senſibility, Contractility. Irritability, Expanſibility, Corruptibility.	The variations or degree of which diſtinguiſh	Man, Mammalia, Birds, Reptiles, Serpents, Fiſhes, Molluſca, Cruſtacea, Inſects, Worms, Zoophytes, Plants.

53 Effects of life.

The differences that are found to prevail between organized beings and inorganic matter, have always been attributed to ſomething of a ſuperior nature, called vitality or life. This term life forms one of thoſe ſimple ideas which it is difficult to define, and as all underſtand the meaning of the expreſſion, a definition is the leſs neceſſary; but if it be required, it cannot be expreſſed more accurately than in the language of Bichat, who calls life *the ſum of thoſe functions which reſiſt death*. In ſhort, life is beſt deſcribed by the effects produced on a body while it reſides in it, contraſted with theſe appearances which take place in the ſame body when life is no longer preſent.

54 Reſiſtance to chemical change.

One of the moſt general effects of the preſence of life is, as we have ſaid, the reſiſtance which living beings are by it enabled to oppoſe to the operation of external agents; and this is moſt remarkably ſeen with reſpect to temperature. Every living being poſſeſſes, in a greater or leſs degree, the power of preſerving nearly an uniform temperature, which is always a few degrees greater than that of the medium in which it lives. In plants, this power ſeems to exiſt but in a low degree. Some of the lower animals which inhabit the air, particularly inſects, poſſeſs it much more completely. The great heat generated in a hive of bees is a familiar illuſtration of this. In birds this property is very remarkable, the heat of their bodies being greater than that of any other ſpecies of animals. The heat of fiſhes, worms, and of moſt reptiles, very little exceeds the temperature of the medium in which they reſide; but when the water in which fiſhes live is frozen, they are capable of reſiſting, for a long time, the conſequences of the diminiſhed temperature. The power which many animals poſſeſs of reſiſting high degrees of heat without any conſiderable increaſe of their own temperature, ſeems ſtill more remarkable, and probably led to the fable of the ſalamander, which was ſuppoſed able to endure the heat of fire, and even extinguiſh it, when thrown in for that purpoſe.

55 Degrees of vitality.

Life ſeems to pervade almoſt every part of a living being. In animals, every part except the cuticle, hair, and nails, exhibit marks of vitality; but it ſeems to be diſtributed

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tributed through thoſe parts in a different manner in the various tribes of organized beings. In plants, and in a few of the inferior animals, as the zoophyta, it ſeems to exiſt independently in almoſt every part. A bud, ſlip, or ſucker, torn from the parent plant, and inſerted within the bark of another plant, or placed within the earth, in favourable circumſtances, vegetates, increaſes, and in due time becomes a perfect plant, in all reſpects ſimilar to the parent ſtock. If a polypus be cut in pieces, each piece lives and grows, till it becomes itſelf a complete polypus. If a worm be cut in two, ſo as to leave one part with the head, and the other with the tail, each part becomes a perfect worm, poſſeſſing both head and tail. As we aſcend, however, in the ſcale of beings, we find life leſs equally and independently diffuſed. A part cut or torn from the body of moſt animals quickly loſes its vitality; but this is loſt ſooner in ſome animals than in others. The head of a turtle or a ſnake is able to bite many hours or even days, after it is ſevered from the body; and in the former inſtance, the animal ſeems for a long time to experience little inconvenience from its loſs. The heart of a frog is ſeen to move many hours after it is cut out.

56 Functions of living beings.

The principal effects of the preſence of life appear in the exerciſe of thoſe functions or actions by which living beings preſerve their exiſtence, or reproduce their like.

57 Motion.

One of the moſt general properties of organized beings is that ſuſceptibility to motion, which is called irritability, which appears eſſential to life, and is poſſeſſed, in a greater or leſs degree, by every claſs of organized beings. The motions of plants are ſometimes very remarkable, and approach very nearly to thoſe which take place in animals. The ſtamina of the *ciſtus helianthemum* are ſeen to move in various directions when the ſun ſhines on them; the leaves of the *mimoſa pudica* (ſenſitive plant), when touched by the hand, or when irritated by the alighting of an inſect on them, immediately contract; the *dionæa muſcipula* (Venus's fly-trap), when a fly touches its leaves, cloſes the thorny fringes with which they are beſet, on the preſumptuous inſect, and cruſhes it to death; but the motions of the *hedyſarum gyrans* are the moſt remarkable of all thoſe that take place in plants. The leaves of this extraordinary vegetable are ſeen in conſtant motion through the greateſt part of the day, without the intervention of any apparent external impulſe; and even when a branch is cut off and kept in water, the motion of the leaves continues for many hours together. All the plants which grow above the earth, expoſe their leaves and flowers to the warm ſunſhine, and when ſituated in a place which is ſupplied by light only from one quarter, they gradually direct their branches towards that part by which the light enters. In ſtormy weather they retract their leaves, and fold up their flowers, and when confined in the dark, their branches retain the poſition which they had when laſt expoſed to the light.

The motions of many of the lower animals, though ſufficiently apparent, are more obſcure than thoſe of plants. A muſcle or an oyſter ſeems to poſſeſs little more motion than is neceſſary to open and cloſe the valves of its ſhell, and, no more than plants, has the faculty of conveying itſelf from place to place. This faculty of locomotion, which in all the higher claſſes of animals is dependent on the will, will be fully conſidered in the ſecond chapter.

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58 Digeſtion.

The function which appears to be moſt univerſally diffuſed in living beings, is digeſtion, (including nutrition) or that by which the ſubſtances intended for their nouriſhment are aſſimilated to the nature of the body which they enter. This function varies conſiderably in the different claſſes. Plants merely attract water from the earth in which they grow, by means of the fibrous parts of their roots, whence it is conveyed by innumerable capillary veſſels throughout the whole plant, in which it appears partly to be decompoſed, and partly to remain in the ſtate of water, diluting ſome of the vegetable principles, and thus forming the juices of the plant. In ſome of the inferior animals, digeſtion ſeems to be almoſt the only function which they are capable of performing. Thus, many of the zoophytes, as the polypi, appear to be almoſt entirely compoſed of a ſtomach, reſembling the finger of a glove, into which the aliment is received, the nutritive part extracted, and the excrementitious part thrown out by the ſame opening. In moſt other animals, the alimentary canal has two diſtinct openings, one for the reception of the food, and the other for the ejection of the excrement.

By ſome animals the food is ſwallowed entire, and digeſtion is performed by a ſimple ſolution or maceration in the ſtomach; while in others the mouth is furniſhed with teeth, or other hard parts, capable of reducing the aliment to a pulpy ſtate, in order to render its further digeſtion more eaſy and expeditious. In moſt animals, the food having undergone ſome change in the digeſtive organs, is taken up from them by certain very minute veſſels, and carried to every part of the body; but in ſome it appears rather to exude through pores in the ſides of the alimentary canal.

59 Circulation.

The function of circulation, by which the fluids are conſtantly moved through every part of the body, is not ſo general as either of the former functions. In plants there is no proper circulation; for although there are numerous veſſels by which water enters into the ſubſtance of the plant, and in which the peculiar juices of the vegetable move, the motions of theſe fluids are not uniform, and do not tend towards one centre. The ſame defective circulation appears in many of the inferior animals, as in zoophytes and inſects. As we riſe, however, to the higher claſſes, we find a perfect circulation. In theſe there is always a peculiar organ from which the fluids are conveyed to the reſt of the body, and to which they again return in a perpetual round. In ſome animals this central organ is ſingle, while in others it conſiſts of two ſimilar organs joined together, from one of which the whole of the fluids proceed thro' one particular organ in a leſſer circulation, and thence return to the other part, before they are diſtributed to the general ſyſtem.

60 Reſpiration.

All organized beings require more or leſs the preſence of atmoſpheric air for their ſubſiſtence, or at leaſt for the due performance of the vital functions. In ſome, the agency of this fluid is conveyed merely by pores upon the ſurface; as in plants, in which the leaves abſorb the air; and in ſeveral of the inferior animals, as inſects and worms, over the ſurface of whoſe bodies are diſtributed numerous openings, by which the air enters. In animals of the higher orders there are peculiar organs

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called lungs or gills, through which air, or water containing air, enters, and from which its beneficial influence is imparted to the fluids which are circulating through them. In general, they [illegible] for a very ſhort time, when deprived of atmoſpheric air, or when the element in which they live is deprived of oxygen: but in ſome of the lower claſſes of animals the abſence of oxygen is much leſs injurious; and there are inſtances of reptiles in particular having been preſerved in a ſtate ſuſceptible of life and motion, while buried for many years in the heart of a tree, or in the middle of a block of ſtone. Reſpiration, then, though in general neceſſary to the continuance of vitality, may, in many tribes of organized beings, be ſuſpended for a conſiderable time, without the principle of life being entirely deſtroyed.

61 Reproduction.

A function equally general, and equally indiſpenſible with that of digeſtion, and one which forms another characteriſtic of living beings, is the function of regeneration, a function more peculiarly neceſſary, as all organized beings, though capable of reſiſting for a conſiderable time the operation of external agents, tend ultimately to corruption and decay; and as they cannot, like inorganic matter, be regenerated by a reunion of their component principles, it was neceſſary that they ſhould poſſeſs the capacity of producing, while in exiſtence, a creature ſimilar to themſelves, to ſupply their place in the ſcale of being.

It has been a very general opinion among naturaliſts, that all living beings, both plants and animals, originate from ſeeds or eggs produced by the parent. This, although very generally true, is not a univerſal fact. Moſt plants, indeed, with which we are acquainted, appear capable, in their natural ſtate, of producing ſeeds, which form the embryo of a future plant. But in a great many of them new plants are obtained from buds, ſlips, or ſuckers, furniſhed by the parent. In ſome animals too, as the polypi, reproduction may be effected by dividing the parent into ſeveral pieces; and even the natural generation of theſe animals is performed by protuberances which grow from the body of the parent, and ſeem to drop off ſpontaneouſly, when capable of an independent exiſtence.

There are two ſtriking differences in the manner by which living beings are generated. In ſome, two diſtinct ſets of organs are neceſſary, and by the mutual action of theſe generation is effected; while in others, as in the inſtances we have mentioned of the polypus, this act of copulation appears to be unneceſſary. Almoſt all plants poſſeſs diſtinct ſexual organs, and in moſt both male and female organs are ſituated in the ſame individual. In theſe plants the female ovum is impregnated by a very fine powder, which is contained in part of the male organs, and is applied to thoſe of the female. We are eaſily convinced of the neceſſity of the vegetable copulation, by obſerving that the females of thoſe plants which have the ſexual organs ſituated in diſtinct individuals are not capable of producing fruit, or at leaſt do not produce this in perfection, if they are excluded from the influence of the male; and that an artificial impregnation may be brought about by bringing the male and female organs in contact. Many animals are hermaphrodite; and among theſe the individuals of ſome ſpecies generate without the aſſiſtance of another individual of the ſame ſpecies. This appears to be the caſe with the bivalve ſhell-fiſh. Others again, as ſnails, and moſt of the molluſca, when [illegible] upon the earth, copulate reciprocally, or each individual performs the double office of male and female. In moſt animals, however, the ſexes are diſtinct, and probably a real hermaphrodite in the ſuperior claſſes never exiſted. Another ſtriking difference with reſpect to generation in animals is the more or leſs perfect ſtate in which they bring forth their young. A large proportion of animals, among which are the inſects, fiſhes, and birds, produce eggs, which are afterwards hatched by the heat of the parent, or by that of the ſun. Other claſſes again, as ſome of the amphibia, and the whole of the mammalia, carry their young for a certain time within an organ deſtined for that purpoſe, from which they are excluded in the ſtate of perfect animals.

62 Senſation.

The laſt function which we ſhall here notice, is ſenſation. This appears to be leſs general than any which we have hitherto mentioned. It has indeed been ſuppoſed by many philoſophers and naturaliſts, that plants poſſeſs a degree of ſenſibility; and this opinion has been highly favoured and ſtrenuouſly ſupported by the elegant, but enthuſiaſtic author of the Botanic Garden, and the Loves of the Plants. That plants poſſeſs a ſuſceptibility of receiving impreſſions, and in conſequence of that of being rouſed into action by external ſtimuli, we ſhall readily admit, and ſhall hereafter aſſign to this ſuſceptibility its due importance; but as there is no reaſon to believe that it ever produces ſenſation, we muſt not confound it with the ſenſibility of animals; nor is the difficulty of explaining ſome of the functions of vegetables, without reſorting to the hypotheſis of a vegetable ſenſorium, a ſufficient reaſon for inveſting them with this faculty. It has even been doubted whether ſome of the inferior animals, as the zoophytes, poſſeſs this function, as nervous fibres have not yet been detected in their organization. It is probable, that there is a regular gradation in the tribes of organized beings with reſpect to ſenſation, as well as the other functions; and though we have not been able to diſcover all the links of this chain, theſe will probably, as our knowledge of nature increaſes, come more into view, and we ſhall then be able to reconcile many circumſtances which we cannot at preſent comprehend.

With reſpect to the varieties that take place in the number and degree of the external ſenſes, as poſſeſſed by the various claſſes of animals, we may refer the reader to what has been ſaid on that ſubject in the third chapter of the comparative part of the article ANATOMY.

63 Duration of life.

The duration of life is exceedingly various. We know that there are animals which live but a few hours, as the inſects called *ephemeræ*; and that others, as the *elephant*, the *raven*, and the *pike*, may exiſt for a century. The term of life allotted to plants is alſo various: ſome live only for a year, and are hence called *annual* plants; others exiſt for two years, and are called *biennial* plants; while a few ſurpaſs in longevity any thing with which we are acquainted in animated nature. Thus, the *oak* is ſaid to require 100 years, in order to acquire its full maturity; to retain its perfect vigour for the like term, and to complete at leaſt a third century before it entirely decays. The *cheſnut* is a ſtill more remarkable inſtance of vegetable longevity. The account of the gigantic cheſnut on Mount *Ætna*, given by Brydone and other travellers, which has exiſted for many centuries, muſt be familiar to moſt of our readers. We have hitherto conſidered life as diſplayed in the exerciſe of functions; but it may exiſt independently of this exerciſe, or it may lie dormant for a conſiderable time, till called into action by particular circumſtances. Every one knows how long a ſeed or an egg, when excluded from heat, air, and moiſture, will retain the faculty of producing a plant or an animal. The only proof we have, that this faculty ſtill exiſts is, that when we place the ſeed or the egg in circumſtances favourable to the developement of the embryo which it contains, the proceſs of generation goes on, till the plant or the animal is excluded. We know alſo, that after an organized being has commenced the exerciſe of its functions, this exerciſe may ceaſe for a time, or at leaſt become almoſt imperceptible, while yet the vital power ſhall remain ſuſceptible of reviving its activity at a future period. We then ſay that the animal or vegetable is in a torpid ſtate. On this part of the hiſtory of life we ſhall not enter at preſent, but ſhall defer the conſideration of it till we come to treat of ſleep and death.

The above is a haſty comparative ſketch of the functions exerciſed by the various tribes of organized beings. It is ſufficient to ſhow, that there is in theſe beings a vital power which completely diſtinguiſhes them from brute or inorganic matter.

64 Cauſe of life. A queſtion which naturally ariſes in every thinking mind is, What is the eſſence of life, or on what does it depend? Though we profeſs ourſelves unable to anſwer this queſtion in a ſatisfactory manner, and believe that all who have hitherto attempted to do ſo, have failed in their attempts, it may be acceptable to moſt of our readers to know the opinions of the moſt reſpectable writers on this abſtruſe ſubject. Theſe, therefore, we ſhall briefly ſtate.

65 Opinions reſpecting the vital principle. Theſe opinions have chiefly reſted on the queſtion, whether life be an independent, immaterial principle, or merely a phyſical or chemical modification of matter. We have already, in the hiſtorical view which we have given of the progreſs of phyſiology, mentioned ſome of the more remarkable doctrines reſpecting the principle of life that have been delivered prior to the 18th century; we ſhall here, therefore, only mention thoſe which have been maintained ſince that time.

66 John Hunter. Mr John Hunter, in his valuable treatiſe on the blood, ſuppoſes the principle of vitality to exiſt in that fluid, or that the blood has life; and has founded this doctrine chiefly on the following proofs. Firſt, It unites living parts, when it is effuſed between them. Secondly, It becomes vaſcular like other living parts; its temperature as it flows from the veſſel, is always equal in the moſt oppoſite temperature in which the body can bear expoſure. Thirdly, It is capable of being acted upon by a ſtimulus, as is the caſe when it coagulates. Fourth, Paralytic limbs, though deprived of motion and ſenſation, are yet nouriſhed and preſerved alive by the blood circulating through them.

Mr Hunter's idea of the vitality of the blood is merely the revival of one of the oldeſt phyſiological doctrines on record; namely, that delivered to the Iſraelites by Moſes, that in the blood is the life of an animal.

67 Goodwin. Dr Goodwin, in his work on the connection of life with reſpiration, is of opinion, that the heart is the great ſeat of the principle of life in all the more perfect animals; and that the contractions of the heart with the ordinary ſtimulus is the only mark of the preſence of this principle; that when the heart contracts under ſuch circumſtances, the body is alive; when not, it is dead. Life he therefore defines to be the faculty of propelling the fluids through the circulatory ſyſtem. According to him, the external concomitant circumſtances which operate upon the body in health are heat and reſpiration, which excite the vital principle to action; and whenever the functions of an animal are ſuddenly ſuſpended, and the body puts on the appearance of death, it is always in our power to determine whether it be really dead, by reſtoring the temperature, and by inflating the lungs with proper air. He is of opinion, with ſome others, that there are no means of determining the abſolute deprivation of the vital principle but by the preſence of putrefaction.

It has lately become faſhionable to conſider life as the conſequence of certain chemical changes, which are going on in the body; an opinion which is chiefly ſupported by Hufeland, Girtanner, and Humboldt.

68 Hufeland. According to Hufeland, life is a chemico-animal flame, to the production of which oxygen is abſolutely neceſſary, and the vital power is the moſt general and powerful of all the powers of nature. He conſiders it as the cauſe of organization, and as poſſeſſing the following properties.

1. It has a greater affinity to ſome organized bodies than to others; thus, the polypus may be cut in pieces without being diveſted of it, and a decapitated tortoiſe or a frog deprived of its heart will live a long time after; whilſt to the human body, or a quadruped, it would be inſtant death. According to this phyſiologiſt, it is a general rule, that the ſtronger the affinity between life and an organized being, the more imperfect is the animal; hence the zoophytes, whoſe whole organization conſiſts in a mouth, a ſtomach, and a gut, have a life exceedingly tenacious, and difficult to be deſtroyed. 2. It is in greater quantity in ſome organized bodies than in others. In general, cold-blooded animals live longer than thoſe with warm blood. 3. It frees bodies from the chemical laws of inanimate matter, and transfers the component parts of a body from the phyſical or chemical to the organic or living world. 4. It prevents putrefaction, for no organized body can putrefy unleſs deprived of life.

69 Humboldt. Humboldt is of opinion, that the degree of vitality depends upon the reciprocal balance of the chemical affinities of all the elementary parts of which the animal body is compoſed.

70 Cuvier. Some phyſiologiſts of the preſent day deny the exiſtence of the vital principle altogether. "The idea of life, (ſays Cuvier), is one of thoſe general and obſcure ideas produced in us by obſerving a certain ſeries of phenomena, poſſeſſing mutual relations, and ſucceeding each other in a conſtant order. We know not indeed the nature of the link that unites theſe phenomena, but we are ſenſible that a connection muſt exiſt; and this conviction is ſufficient to induce us to give it a name, which the vulgar are apt to regard as the ſign of a particular principle, though in fact that name can only indicate the totality of the phenomena which have occaſioned its formation."

71 Ferriar. Dr Ferriar, in his obſervations concerning the vital principle, thinks, that ſome direct arguments may be

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brought againſt the general ſuppoſition of an independent living principle. Theſe arguments he divides into two kinds, viz. refutations of the general proofs offered in ſupport of the vital principle; and inſtances of the direct influence of the mind and brain over what is termed the independent living principle. The great proofs for the ſupport of a vital principle are, the contraction of muſcles ſeparated from the body on the application of ſtimulants; the performance of the vital and involuntary motions without any exertion or even conſciouſneſs of the mind, and the birth of full-grown fetuſes deficient of a brain. In all theſe caſes, ſomething is alleged to operate, independently of the mind, in producing muſcular motion.

Dr Ferriar, in anſwer to the firſt argument drawn from the contraction of ſeparated muſcles, affirms, it may be ſaid, 1ſt, That the power of contraction, in a ſeparate muſcle, is loſt before putrefaction takes place, i. e. before the deſtruction of its texture; but if its vitality depended on its texture, this ought not to happen. 2dly, The power of contraction, in a ſeparated muſcle, is ſtrongeſt upon its firſt ſeparation, and becomes weaker by degrees: therefore, the contracting power ſeems to have been derived from ſome ſource from which it is detached by the exciſion of the part. 3dly, Irritation of the *medulla oblongata*, or of the nerves ſupplying particular muſcles, occaſions ſtronger contractions than irritation of the muſcles themſelves; and Dr Whytt furniſhes an experiment on a frog, directly proving, that the action of ſeparated muſcles depends upon the nervous energy. 4thly, Dr Haller himſelf is obliged to make on this ſubject a conceſſion ſufficient to deſtroy his favourite hypotheſis of the *vis inſita*. 5thly, When a paralytic limb is convulſed by the electric ſhock, the motion never takes place without the patient's conſciouſneſs. In this caſe there is no diſtinction between the vital principle, and that exertion which in voluntary motion is always attributed to the mind. See Chap. iii.

In anſwer to the ſecond argument, in favour of a vital principle, drawn from the performances of the vital and other involuntary motions, Dr Ferriar contents himſelf with only obſerving, that, allowing the organs of thoſe motions to be ſupplied with nervous energy, their motions may be very well accounted for by the ſtimulus of their contained fluids.

The force of the third argument, drawn from the want of a brain in full-grown fœtuſes, is taken off by Dr Whytt, who remarks, that as the heart is ſometimes wanting in full-grown fœtuſes, the argument would equally prove, that the heart is not neceſſary for the continuance of circulation, as that the brain is not neceſſary to the ſupport of the ſyſtem. Accordingly, ſœtuſes born without a brain do not, in general, ſurvive birth.

Beſides the general ſuppoſition of an independent living principle, an inference has been drawn from facts, of a nervous energy independent of the brain. By this term is meant, that condition derived from the brain to different parts of the body, by means of which they become capable of motion. To ſhow, by direct proof, that there is no independent vital principle, Dr Ferriar obſerves, 1. That it is juſtly urged by Dr Monro againſt the doctrine of the *vis inſita*, that there is too much deſign in the actions of different muſcles, affected by different *ſtimuli*, to be the effect of mere mechaniſm. Thus, when the hand or foot is burnt, or otherwiſe ſuddenly injured, the muſcles on the part immediately ſtimulated are not thrown into action, nor the muſcles on the ſide irritated, but their antagoniſts contract immediately, and ſtrongly. Now, if the inſtantaneous action be in this caſe chiefly produced by an effort of the mind, the ſuppoſition of a diſtinct vital principle is ſuperfluous: if it be ſaid to be produced by a living power independent of the mind, then there muſt be a rational power in the body independent of the mind, which is abſurd. 2. The ſtate of the vital and involuntary motions is conſiderably affected by the ſtate of the mind, which equally diſproves the exiſtence of a ſeparate vital principle, and proves the dependence of the nervous energy upon the brain. 3. Madneſs, it is well known, is frequently produced by cauſes purely mental, and in perſons apparently in good health; and, as the patient's ſenſibility to very powerful ſtimuli is much diminiſhed in maniacal caſes, they afford another proof of the ſubordination of the nervous energy. 4. It has been obſerved, that in paralytic caſes, motion is frequently deſtroyed, while ſenſe remains. As the cauſe of palſy almoſt always reſides in the brain, this fact appears equally inexplicable on the opinion of a diſtinct living principle, or of a nervous energy, independent of the brain. 5. When nerves are regenerated, after being cut through, ſenſation and voluntary motion are not always reſtored to the parts beneath the diviſion: the reſtoration was never made in Dr Monro's experiments. But, on the ſuppoſition of a diſtinct nervous power, the nerve, after its re-union, ought to reſume all its offices. 6. Dr Whytt aſſerts, that when the ſpinal marrow of a frog is deſtroyed, after decollation, no contraction can be excited in the limbs, by cutting or tearing the muſcles. Such are the facts and arguments which Dr Ferriar brings againſt the opinion of a diſtinct living principle; and he thinks, that their inveſtigation appears to lead us back to the brain as the ſource of ſenſibility and irritability.

72 Ruſh.

In the life of Dr John Brown, we have given an account of the doctrine, of life being a forced ſtate. This doctrine appears to have been firſt delivered by Dr Cullen, though he afterwards retracted it. Of late Dr Ruſh of Philadelphia, in his *Lectures on animal life*, has advanced many arguments in favour of this doctrine. He includes, in animal life, three properties as applied to the human body, viz. *motion*, *ſenſation*, and *thought*; and theſe, when united, compoſe perfect life. It may exiſt without thought or ſenſation; but neither ſenſation nor thought can exiſt without motion. He affirms, that the loweſt degree of life exiſts even in the abſence of motion. He firſt conſiders animal life as it appears in the waking and ſleeping ſtate, in a healthy adult; and afterwards inquires into the modification of its cauſes in the fœtal, infant, youthful and middle ſtates of life, in certain diſeaſes, in different ſtates of ſociety, and in different animals, and lays down the following propoſitions:

1. Every part of the human body, the nails and hair excepted, is endued with ſenſibility or excitability, or with both.

2. The whole body is ſo formed and connected, that impreſſions made in the healthy ſtate upon one part

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excite motion or ſenſation, or both, in every other part of the body.

3. Life is the effect of certain ſtimuli acting upon the ſenſibility and excitability, which are extended in different degrees to every external and internal part of the body; and theſe ſtimuli are as neceſſary to its exiſtence as air is to flame.

He continues to obſerve, that the action of the brain, the diaſtole and ſyſtole of the heart, the pulſation of the arteries, the contraction of the muſcles, the periſtaltic motion of the bowels, the abſorbing power of the lymphatics, ſecretion, excretion, hearing, ſeeing, ſmelling, taſte, and the ſenſe of touch, even *thought* itſelf, are all the effects of ſtimuli acting upon the organs of ſenſe and motion.

Theſe have been divided into external and internal.

1. The external are light, ſound, colours, air, heat, exerciſe, and the [illegible].

2. The internal ſtimuli are food, drink, chyle, the blood, tenſion of the glands which contain ſecreted liquors, and the exerciſe of the faculties of the mind.

Life, therefore, according to the hypotheſis of [illegible] even thought itſelf, is merely a quality reſiding in the component parts of a material ſyſtem, depending upon a peculiar organization, by which it is enabled to act, or in ſome ways to move on being ſtimulated or excited. Hence life can never be inherent in a ſimple uncompounded ſubſtance, nor in a particle of animal matter; and if the ſtimulus be withheld from a living ſyſtem beyond a given time, all motion, ſenſation, and thought, muſt neceſſarily be extinguiſhed.

73 Vital principle ſuppoſed by ſome to be diviſible.

Inſtead of one vital principle, ſome phyſiologiſts have ſuppoſed the exiſtence of ſeveral in the ſame body; and from the phenomena that take place in ſome organized beings, as the reunion of parts that had been ſeparated, the reproduction of others that have been loſt, and the ſeparate exiſtence of the divided parts of ſome worms and zoophytes, it was formerly the opinion of a celebrated lecturer on anatomy, that the vital principle was really divided. From more conſiderate and extenſive inquiry, however, he is now of opinion, that the irritability on which theſe phenomena depend, is never the direct or immediate operation of the vital principle, but only the conſequence of its operation; and in no caſe excluſively the conſequence, but the conſequence likewiſe of other operations proceeding from a number of different cauſes; and hence it is that a vital principle may often exiſt where it cannot operate in a ſenſible manner, from the want of auxiliaries; and hence it is, likewiſe, that its effects may often be continued, at leaſt for a while after its departure.

With regard to the portions of plants and polypi that continue to live in a ſeparate ſtate, aſſume the form of their reſpective ſpecies, and propagate their kind, they will be found, on a cloſe examination, to have been originally complete ſyſtems; many of the plants and many of the polypi that were uſually conſidered as ſimple individuals, not conſtituting one animated ſyſtem, but rather a congeries of animated ſyſtems,—a congeries, too, which after all is nothing more than a ſpecies of ſociety, where animated beings are aſſociated together for mutual protection; ſuch as we ſee among men in ſociety; among bees in their cells, which, in point of form, are ſimilar to plants †.

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[illegible] it ſtretches out the fibres of its roots to imbibe the diſtant moiſture, or directs its branches to the only chink [illegible] having recourſe to the influence of mind, or even the [illegible] we do not believe that the graſs we cruſh beneath our feet is ſenſible of pain, nor do we ſuppoſe with the poet, that

> —— "E'en the poor beetle that we tread on,
> In mortal ſufferance feels a pang as great
> As when a giant dies"——

75 Senſitivity.

but we are of opinion, that even in the loweſt tribes there is a degree of this faculty, which in the higher orders of animals we call [illegible], and which we ſhall here, after a lecturer on the animal economy in London, denominate *[illegible]*. This inferior degree of the ſenſitive faculty we ſhall ſuppoſe to be poſſeſſed by plants, zoophytes, and animalcules, or thoſe organized beings in which we can perceive no marks of a nervous ſyſtem; while we ſhall confine the term [illegible] to all other claſſes of animals.

Theſe faculties we conſider as qualities of living *body*, while we regard ſenſation, like perception, as a quality of *mind*. We leave it to the metaphyſician to mark the line of diſtinction between ſenſibility and ſenſation, and to ſhow how the one ariſes from the other. See METAPHYSICS, Part I. chap. 1.

76 Nervous ſyſtem.

The organs of ſenſation conſiſt of the brain properly ſo called, the cerebellum, [illegible], the ſpinal marrow, the nerves, and ganglia, together forming what is called the *nervous ſyſtem*. Theſe parts in the human body have been deſcribed under ANATOMY. For an account of theſe organs in the inferior animals, we muſt refer to the lectures of Cuvier, vol. ii. or the Comparative Anatomy of Blumenbach.

[illegible] that the animal receives intelligence from without. We ſhall therefore examine theſe before we mention the [illegible].

1. *Of Feeling.*

77 Feeling.

[illegible]

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† *Barclay on Muſcular Motions*, p. 265.

ly diffuſed over the body of an animal is that of touch or feeling. Animals that poſſeſs ſcarcely any other ſenſe ſeem always to have that of *touch*. It is doubtleſs by this that *polypi*, *actiniæ*, and other water animals, perceive the approach of their prey, or are warned of impending danger, from the agitation of the water that is communicated to their bodies. Indeed ſo general is this ſenſe, that ſome phyſiologiſts think we may reduce all others to it as a genus; and ſuppoſe that *ſmelling*, *taſting*, *hearing*, and *ſeeing*, are only ſpecies of *feeling*. This reference is not uncommon in ordinary ſpeech, as it is not unuſual to talk of *feeling* a *ſmell*.

78 Uſe. By *touch*, taken in its ordinary limited ſenſe, we perceive the more ſtriking external qualities of bodies, as *figure*, *hardneſs*, *ſoftneſs*, *roughneſs*, *ſmoothneſs*, *moiſture*, *dryneſs*, *heat*, *cold*; of all which, except figure, we could ſcarcely form any idea by the other ſenſes. There is probably no ſenſe that can ſo well ſupply the place of others as that of *touch*; and it is particularly acute in thoſe who have loſt their ſight or hearing. See the article Blind, eſpecially the Appendix.

79 Organs. The organs of touch are the ſkin and its productions, or rather the nervous papillæ (ſee Anatomy, N° 76.) that form ſo large a part of the true ſkin. As many animals, however, have the body ſo enveloped in a ſcaly, ſhelly, or hairy covering, as to prevent the actual contact of the body by external objects, there are other organs that ſeem deſtined to fulfil this office. In man, the points of the fingers and the lips are the moſt delicate feeling organs; in many quadrupeds too, the lips ſeem to poſſeſs an exquiſite ſenſibility, and in ſome, as the *rhinoceros*, the upper lip is lengthened out as if to ſerve the purpoſe of a hand. The prolonged ſnouts of the *tapir*, the *ſhrew*, the *mole*, and the *hog*, ſeem to anſwer the ſame purpoſe; and the exquiſite ſenſibility and flexibility of the trunk of the elephant is well known to fit that organ for almoſt all the purpoſes to which the human hand can be applied. The tail, in ſome ſpecies of *monkey*, *oppoſum* and *ant-eater*, and in ſome reptiles, ſeems to poſſeſs a high degree of ſenſibility. In ſome animals, as the *cat*, the whiſkers are employed as organs of *feeling*, as we know that theſe are erected when the animal is paſſing through a narrow hole. Several ſpecies of fiſhes have *cirri* and *tentacula*, which they ſeem to uſe as fingers in aſcertaining the approach of their prey; and in inſects, the *antennæ* and the *palpi* are evidently organs of feeling, as are the arms, the tufts, and tentacula of *ſea-ſtars*, *ſea-urchins*, *actiniæ*, *meduſæ*, and many zoophytes.

80 Nature of touch. Moſt of the actions of external bodies on the ſurface of the animal body, are merely mechanical, though the ſenſations which they communicate may often be the effects of a chemical change in ſome of the feeling organs, and this change can be produced only in conſequence of the power of ſimple preſſure, to form or deſtroy ſome of the combinations that take place in the animal ſyſtem. The ſenſations which appear moſt evidently to ariſe from a chemical change in the organs, are thoſe that give notice of a change of temperature. When a body that has a temperature below that of the animal, comes in contact with the ſurface of this latter, we know that it abſtracts from that ſurface a part of its caloric, as by the contact it gradually acquires the temperature of the animal; unleſs, indeed, it be ſo large and ſo cold as altogether to deſtroy life. As, however, the reſiſtance which the animal body gives to a too great change of temperature, generally confines this change to the ſurface of the body; there muſt be ſomething more than a mechanical or a chemical action, or the ſenſe of feeling muſt depend chiefly on the vital principle.

81 Univerſality of feeling. As the ſenſe of feeling, from its general diffuſion, may be conſidered as the moſt eſſential of all the ſenſes; its degrees of perfection have conſiderable influence on the nature of different animals.

Of all *vertebral* animals, man ſeems to poſſeſs this ſenſe in the moſt perfect degree; but among the *invertebral* animals, the touch ſeems to improve as the other ſenſes degenerate; and thoſe animals which appear to have no other ſenſe, poſſeſs this in ſo exquiſite a degree that they ſeem to feel even the light.

Dr Darwin thinks it probable, that the animal body is furniſhed with a diſtinct ſet of nerves for the ſenſation of *heat* and *cold*. We do not ſee the neceſſity of this, as we think that this ſenſation is very naturally reducible to that of *feeling*.

82 Senſibility of the animal body. To this head naturally belongs the conſideration of what parts of the human body poſſeſs ſenſibility, and what are inſenſible. This diſcuſſion is curious, and ſome time ago exerciſed the ingenuity of two very able phyſiologiſts, Haller and Whytt; between whom it gave riſe to a long and warm diſpute. We cannot pretend to enter into the merits of this controverſy, for an account of which we refer our readers to Dr Whytt's *Phyſiological Eſſays*, and to the *Principes de Phyſiologie* of Dumas, tom. ii. part. iii. ſect. 1. chap. 1.

The general reſult ſeems to be, that many parts will appear ſenſible or inſenſible, according to the nature of the ſtimuli applied to them, and that many of thoſe parts which in their natural and healthy ſtate appear inſuſceptible of pain, are when inflamed or otherwiſe altered by diſeaſes, highly ſenſible; and that the brain, which is conſidered as the centre of all ſenſation, and the puncture or laceration of which is attended with moſt diſtreſſing ſymptoms in other parts, is to ordinary ſtimuli as inſenſible as the cuticle or the nails. See alſo on this ſubject, Bichat "Anatomie Generale," tom. i. p. 161.—167.

The principal morbid affections of this ſenſe, are *pain*, *itching*, and *want of feeling*; for an account of which ſee Medicine, N° 77. The functions of the ſkin, independently of its uſe as an organ of touch, will be conſidered in two of our ſucceeding chapters.

2. *Of Taſting.*

83 Taſting. This ſenſe is the moſt nearly allied to feeling of any of the other ſenſes, and therefore very properly comes under our conſideration after that ſenſe.

84 Organs. The principal organ of taſte is the tongue, eſpecially at its upper ſurface, point, and edges; but it alſo extends to the lips, the palate, and the *velum pendulum palati*. The tongue is not abſolutely neceſſary to taſte, as appears from a caſe mentioned by Juſſieu, of a perſon who had only a fleſhy tubercle in place of a tongue, and yet poſſeſſed the ſenſe ſufficiently perfect.

85 Different organs variouſly affected. The ſeveral parts of the organs of taſte are not equally ſenſible to every ſapid body; the tongue ſeems to be more particularly affected by ſaline and ſaccharine ſubſtances, chiefly, however, at its upper ſurface; the lips are ſaid to

be moſt ſuſceptible of the taſte of *hellebore*, the palate of *belladonna*, and the gullet of *wormwood*. The *momordica elaterium* is ſaid chiefly to affect the back of the tongue, and *colocynth* its middle.

86 On what the perfection of taſte depends.

The greater or leſs perfection of this ſenſe depends much on the ſoftneſs, flexibility, and moiſtneſs of theſe parts. As man ſeems to poſſeſs theſe qualifications in a more eminent degree than moſt other animals, ſo, in the natural unſophiſticated ſtate of the tongue, he probably enjoys the benefit of taſte much more highly than they. Such is the caſe with all young children, and with the peaſant, whoſe ſimple fare appears to be eaten with a much greater reliſh than all the delicacies of the voluptuary, who muſt have recourſe to various ſtimuli to enable him to derive gratification from even the daintieſt viands (A).

Taſte ſeems to be more exquiſite when the ſapid body is ſtrongly preſſed between the tongue and the palate. Taſte is alſo rendered more acute when the tongue is ſtimulated by various condiments, as *pepper*, *muſtard*, which even, when not taken in ſuch quantity as to be very perceptible themſelves, evidently increaſe the reliſh of the diſhes which they ſeaſon. Much alſo depends on the nature and ſtate of the bodies that are applied to the organs of taſte. Theſe muſt, in the firſt place, be either fluid, or capable of ſolution in the ſaliva. They muſt alſo poſſeſs ſome ſaline or acrid quality, to render them capable of acting on the nervous *papillæ*. It was formerly ſuppoſed, that ſaline bodies alone poſſeſſed the power of affecting the organs of taſte; and it was conceived by Bellini, that the different flavours of ſaline bodies depended on the figure of their cryſtalline particles. M. Dumas has taken conſiderable pains, and has advanced ſeveral arguments, to ſhow the abſurdity of this hypotheſis; and we think has treated it with more ſeriouſneſs than it deſerves. That the different ſenſations which ſapid bodies excite in our organs of taſte, depend chiefly on a difference in their chemical nature, muſt, we think, be allowed, and ſome have gone ſo far as to ſuppoſe, that the ſenſation depends on ſome chemical affinity between the ſapid body and the nervous fluid.

87 Modifications of taſte.

The impreſſion which ſapid bodies make on the organs of taſte is modified by age, ſex, temperament, and habit. We know that children are particularly pleaſed with ſweet things, while high ſeaſoned diſhes and vinous liquors are more palatable to people of a more advanced age. Women, from various cauſes, eſpecially during pregnancy, and when labouring under hyſteric affections, have often very ſingular taſtes. People of a warm and a mobile conſtitution are often affected by flavours that are almoſt inſenſible to others; and cuſtom will render palatable many ſubſtances, which, when firſt taſted, are rejected with diſguſt.

88 Uſes of taſte.

Beſides the gratification afforded to animals by the ſenſe of taſte, this is ſuppoſed to afford one of the principal means of diſtinguiſhing between wholeſome and deleterious ſubſtances. Indeed, with reſpect to the inferior animals, this diſcriminating ſenſe is ſeldom known to fail, and in this inſtance, they are ſuperior to man, who is often deceived. There are many poiſonous herbs, the fruits or roots of which have a taſte not unpleaſant, but which cannot be eaten with impunity.

On the morbid affections of taſte, ſee MEDICINE, N° 78.

3. *Of Smelling.*

89 Smelling.

The ſenſe of ſmelling, like that of taſte, is nearly allied to feeling, and is one of thoſe by which we become acquainted with the mechanical and chemical properties of external bodies. It is cauſed by volatile particles flying off from odorous bodies, and diffuſed or diſſolved in the atmoſphere, in union with which they enter the noſtrils and affect the nerves of the ſmelling organs.

90 Organs.

It is difficult to aſcertain what are the eſſential organs of ſmelling. We know that in moſt animals which breathe through lungs or gills, there is either a noſe, or there are certain holes that ſerve the purpoſe of noſtrils; but in many animals there is nothing ſimilar to theſe, and yet there is every reaſon to believe that they poſſeſs the ſenſe of ſmelling in an exquiſite degree.

Inſects diſcover their food at a diſtance. Butterflies ſeek their females, even when incloſed in boxes; and as they are liable to be deceived by reſemblance of colour, it is evident that theſe inſects are guided in many circumſtances by the ſenſe of ſmell. Thus the fleſh-fly (*muſca vomitoria*) lays its eggs on plants that have a fœtid ſmell, imagining that it places them on corrupted fleſh, and the larvæ which are thus produced periſh for want of their neceſſary food.

As the organ of ſmell, in all animals which reſpire air, is ſituated at the entrance of the organs of reſpiration, the moſt probable conjecture that has been propoſed reſpecting its ſeat in inſects, is that of Baſter, ſince revived by ſeveral naturaliſts, who placed it in the mouths of the tracheæ or air tubes. Beſide many other reaſons that might be ſtated in ſupport of this opinion, we may obſerve, that the internal membrane of the tracheæ appears very well calculated to perform this office, being ſoft and moiſtened, and that the inſects in which the tracheæ enlarge, and form numerous or conſiderable veſicles, are thoſe which ſeem to poſſeſs the moſt perfect ſenſe of ſmelling. Such are all the *ſcarabæi*, the *bees*, *flies*, &c.

The antennæ, which other anatomiſts have ſuppoſed to be the ſeat of ſmelling in inſects, do not appear to Cuvier to poſſeſs any of the requiſites for that organ.

The *molluſca*, which reſpire air, may alſo poſſeſs this ſenſation at the entrance of their pulmonary veſſels; but it is not neceſſary to ſearch for a particular organ of this ſenſe in them, as their whole ſkin appears to reſemble a pituitary membrane. It is everywhere ſoft, fungous, and is always moiſtened by a great quantity of mucous matter. Finally, it is ſupplied with numerous nerves, which animate every point of its ſurface.

The

(A) It is generally ſuppoſed, that the ſenſe of taſting is more acute in ſome of the inferior animals than in man; an opinion which is founded chiefly on the greater ſize and number of the *papillæ* of the tongue in theſe animals. It is ſcarcely poſſible to decide this point; but we ſhould conceive, from the infinite variety of ſubſtances that are occaſionally ſubjected to the human palate, and from the extreme delicacy of taſte diſplayed by ſome individuals, that man has the advantage of his brute neighbours in this ſenſe.

The worms and ſoft zoophytes, and all the polypes, are probably in the ſame ſituation. It can not be doubted but that theſe animals enjoy the ſenſe of ſmell. It is chiefly by it that they diſcover their food, particularly the ſpecies that have no eyes. Ariſtotle remarked, that certain herbs, which have a ſtrong odour, were avoided by *earth-flies* and the *polypes*.

91 Nature of odours little underſtood.

Of all the ſubſtances which affect our organs of ſenſation, odours are the leaſt underſtood, though the impreſſions which they make on the animal body appear to be moſt powerful and extenſive. Some bodies are always odorous, becauſe the whole or a part of their ſubſtance, being volatile, it is conſtantly flying off: others become odorous, only under certain circumſtances; as when a body containing a volatile principle in its compoſition is decompoſed by another that has a leſs affinity for that principle, e. gr. when *muriate of ammonia* is decompoſed by quicklime.

Odours ſeem to be propagated in the air, much in the ſame manner as one fluid is diffuſed through another. Their motion is not direct like that of light, nor is it rapid or ſuſceptible of reflection and refraction like light and caloric. The odorous particles of volatile bodies may enter into combination with different ſubſtances, by chemical affinity, and thus loſe their original properties. In this way the effluvia of putrid meat are deſtroyed by freſh burnt charcoal, and the noxious exhalations from peſtilential apartments are removed by the vapours of nitric or muriatic acid.

Theſe circumſtances ſeem to prove that each ſmell is occaſioned by a particular ſubſtance floating in the atmoſphere. There are others, however, which appear to indicate that odour is not always produced in this manner.

Several bodies yield a ſtrong ſmell for a great length of time, without ſuſtaining any ſenſible loſs of ſubſtance; ſuch, for example, is muſk. Some odours are perceived when no evaporation can be obſerved, as the ſmell which ariſes from the friction of copper, that produced by the friction of a great number of bodies, and even by the melting of common ice. In other caſes, real evaporations produce no ſenſible odour; this may be remarked on the diſengagement of ſeveral gaſes, and even on the ordinary evaporation of water. Perhaps theſe phenomena prove only that the force of ſenſation is not proportional to the quantity of the ſubſtance by which it is excited, but that it depends on the nature and degree of the affinity of that ſubſtance with the nervous fluid.* The action of the greater part of odorous ſubſtances on the nervous ſyſtem, is rendered manifeſt by a number of other effects beſides the ſenſation of ſmell; ſome produce faintings, others giddineſs, or even convulſions. Some, on the contrary, ſerve to remove theſe diſorders. Indeed the greater part of medicines act in general rather by their volatile and odorous parts, than by their other principles; and afford new proofs of the influence exerciſed in the animal economy by the gaſeous and imponderable ſubſtances, the greater part of which are doubtleſs ſtill unknown to us.

We know not whether odours have a peculiar vehicle, beſides the matter of heat, which is common to them all in their quality of vapours or elaſtic fluids. We cannot explain why odours are agreeable or diſagreeable to us, nor why thoſe that are diſguſting to us appear pleaſing to other animals, and *vice verſa*. Though man and other animals are generally pleaſed with the odour of thoſe ſubſtances which ſerve them as food; yet when their appetite is ſatisfied, this odour often becomes diſguſting to them. On the contrary, ſome animals appear to have a paſſionate fondneſs for ſtrong ſmelling ſubſtances which ſeem altogether uſeleſs to them. Thus cats are extremely fond of *cat-mint*, and the freſh roots of valerian. In general, thoſe odours which are moſt diſagreeable indicate that the ſubſtances from which they proceed are injurious. Thus venomous plants, putrid fleſh, and poiſonous minerals, have commonly an unpleaſant odour. This rule, however, is not univerſal; and the ſenſe of ſmell, like that of taſte, is not an unerring guide to man, whatever it may be to other animals.

It appears that the effluvia of odorous bodies are capable of diffuſing themſelves through water as well as air; for when theſe ſubſtances are thrown into water as bait for fiſh, we find that theſe animals are attracted by the ſmell from a conſiderable diſtance.

92 Comparative phyſiology of ſmelling.

The comparative phyſiology of this ſenſe is very curious, though we cannot explain the reaſon of the differences that we find to take place in the various tribes of animals. Man in a ſtate of civilized ſociety, where he may have recourſe to a great variety of means by which to diſtinguiſh the properties of bodies, has leſs occaſion for acuteneſs of ſmell; but we know that ſavages are in that reſpect greatly his ſuperiors. Their ſmell is ſo acute, that like a blood-hound, they can ſcent their enemy to a great diſtance, and purſue his track with almoſt certain ſucceſs. Among birds and beaſts of prey we alſo find that acuteneſs of ſmell is a very general property. Hyænas, wolves, vultures, and ravens, can diſtinguiſh the putrid carcaſes on which they feed many miles off; and it is aſſerted by naturaliſts, that jackalls hunt in packs, and follow their game like hounds by the ſcent. There is a curious diverſity in this reſpect among birds, ſome having this ſenſe very acute, others very blunt. We are told by Gattoni*, that the cock is ſcarcely affected with the ſmell of ammonia or hartſhorn, while the duck is ſaid to avoid all powerful odours whether agreeable or otherwiſe. We are not ſufficiently acquainted with the nature of the olfactory membrane, nor with that of the nerves diſtributed to it, to enable us to form an opinion reſpecting the degree and the kind of ſenſations they procure to different animals. It may, however, be at firſt ſight preſumed, that all things in other reſpects being equal, the animals in which the olfactory membrane is moſt extenſive, enjoy the ſenſation of ſmell moſt exquiſitely; and experience confirms this conjecture. It would be curious to learn why the animals which poſſeſs the ſenſe of ſmell in the higheſt degree, are preciſely thoſe which feed on the moſt fetid ſubſtances, as we obſerve in *dogs* which eat carrion.

4. *Of Hearing.*

93 Hearing.

The ſenſe of *hearing* is more important than any which we have yet noticed, but it appears to be leſs generally diffuſed.

By means of it we become acquainted with thoſe properties of bodies which fit them for making ſenſible impreſſions on the air, as hardneſs, elaſticity, &c.; and theſe impreſſions on the air, when communicated to the organs of hearing, convey to our mind the ideas of ſound. By

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* Cuvier.

* *Scarpa de Auditu et Olfactu.*

Of Senſation.

By this ſenſe we derive two of the higheſt gratifications that we are capable of enjoying, viz. the pleaſures of converſation and of muſic; and in this way moſt animals hold intercourſe with each other.

94 Organs.

The organs of hearing differ exceedingly in the various claſſes of animals. The human ear and its appendages have been deſcribed in ANATOMY, Part I. chap. vi. ſect. 4; and for an account of theſe organs in other animals, we muſt refer to Cuvier's Lectures, vol. ii. or the Comparative Anatomy of Blumenbach, chap. xv. Red-blooded animals without exception have evident auditory organs, and analogous parts are found in many of the white-blooded. The great number of the inferior claſſes, however, in which none yet have been aſcertained, though it is certain that many of them actually hear. In all thoſe in which theſe organs have been detected, there is always found a gelatinous pulp, covered with a fine, elaſtic membrane, and in this pulp the ramifications of the auditory nerve are loſt. It is therefore, highly probable that the ſeat of hearing reſides in the minute nervous fibres that are diſperſed through the pulp, and that this latter is the medium by which ſounds are communicated from the percuſſed air. We may form a tolerably juſt idea of the manner in which this pulpy ſubſtance is connected with the external movements that are the cauſe of ſound; for this quivering jelly will readily receive the concuſſions of the air or water that are tranſmitted to it from the vibrations of ſonorous bodies, and communicate them to the nervous filaments. Thus far only can we trace the motion of ſound; but the ſteps by which this motion is carried on till the perception of ſound is produced in the mind, are equally unknown to the anatomiſt and the metaphyſician.

95 Varieties of ſound.

The philoſophy of ſound has already been treated of under ACOUSTICS. It is neceſſary here to remark only, that the qualities of ſound may be diſtinguiſhed into *force*, depending on the extent of the vibrations of the body from which the ſound proceeds; *tone*, depending on the velocity of the vibrations; *reſonance*, ariſing from the intimate compoſition of the ſonorous body; *ſimple modulations of voice*, and *articulations*.

96 Comparative phyſiology of hearing.

The human ear can diſtinguiſh all [illegible] different qualities with relation to one ſound; this diſtinction is made with wonderful accuracy, by perſons who [illegible] exerciſe that faculty, and particularly by profeſſional muſicians. The other mammalia exhibit proofs that they are capable of diſtinguiſhing the qualities of ſound which relate to ſpeech, that is to ſay, *ſimple vocal modulations* and *articulations*; for we may obſerve [illegible] remember the ſound and ſignification of ſeveral words. Some are ſtrongly affected by certain ſounds. Acute tones produce a painful ſenſation in *dogs*, and we alſo obſerve that theſe animals are terrified by violent noiſes; they therefore diſtinguiſh theſe two properties. Birds have a feeling, no leſs exquiſite, of *voice*, *tone*, *articulation*, and even *reſonance*, ſince they learn to ſing with great correctneſs; and when their vocal organs permit them, can completely counterfeit the human ſpeech, with all the modifications practiſed by the individuals they imitate.

As to cold-blooded animals, it is well known that ſeveral of them call each other by certain ſounds, and that others, which are incapable of producing ſounds, can at leaſt underſtand them, as *carps*, which appear when the noiſe of a bell indicates to them that they are to be fed, &c.; but we know not what qualities of ſound they diſtinguiſh, and how far, in this reſpect, the delicacy of their ſenſe of hearing extends*.

For the morbid affections of hearing, ſee MEDICINE, N° [illegible].

5. Of Sight.

97

As we aſcend from the ſimpler to the more complicated ſenſes, we find a greater ſcope for deſcription and obſervation; but we alſo find our phyſiological difficulties increaſed. The ſenſe of touch, being the moſt ſimple of all the ſenſes, requires but a ſimple organization, and is the moſt widely diffuſed; that of viſion, on the other hand, is the moſt complex, and requires for its due exerciſe, a more elaborate ſet of organs. There is not, in the whole animal ſtructure, a more curious and admirable organ than the eye, whether we contemplate it in its moſt perfect ſtate in the human body, or in its moſt ſimple conſtruction, as it appears in the head of a ſnail.

98 Organs.

The ſtructure of the human eye has been ſufficiently deſcribed in the article ANATOMY, Part I. chap. vi. ſect. 5.; and if our readers deſire a fuller account of this organ, we may refer them to the elegant work of Profeſſor Sömmering. The ſtructure of the eye in the inferior animals is well deſcribed in Cuvier's twelfth lecture, and in Blumenbach's Comparative Anatomy, chap. xvi. We ſhall extract from the former a deſcription of the eyes of inſects and cruſtaceous animals, as being among the moſt curious and leaſt known objects of comparative anatomy.

"The ſtructure of the eye of inſects is ſo very different from that of other animals, even the molluſca, that it would be difficult to believe it an organ of ſight, had not experiments, purpoſely made, demonſtrated its uſe. If we cut out, or cover with opaque matter, the eye of the *dragon-fly*, it will ſtrike againſt walls in its flight. If we cover the compound eyes of the *waſp*, it aſcends perpendicularly in the air, until it completely diſappears; if we cover its [illegible] attempt to fly, but will remain perfectly immoveable.

"The ſurface of a compound eye, when viewed by the microſcope, exhibits an innumerable multitude of hexagonal facets, [illegible] and ſeparated from one another by ſmall furrows, which frequently contain fine hairs, more or leſs long.

"Theſe facets, [illegible] membrane, which, when freed of the ſubſtances that adhere to it poſteriorly, is very tranſparent.

"Each of theſe ſmall facets may be conſidered either as a cornea, or a cryſtalline; for it is convex externally, and concave internally, but thicker in the middle than at the edges, it is alſo the only tranſparent part in this ſingular eye.

"Immediately behind this tranſparent membrane there is an opaque ſubſtance, which varies greatly as to colour in different ſpecies, and which ſometimes forms, even in the ſame eye, ſpots or bands of different colours. Its conſiſtence is the ſame as that of the pigment of the *choroides*; it entirely covers the poſterior part of the tranſparent facets, without leaving any aperture for the paſſage of the light.

"Behind this pigment we find ſome very ſhort white filaments, in the form of [illegible], placed cloſe to each other, like the ſtones of a pavement, and

* Cuvier Comp. Anat. [illegible]

preciſely equal in number to the facets of the cornea; each penetrates into the hollow part of one of theſe facets, and is ſeparated from it only by the pigment mentioned above. If theſe filaments are nervous, as in my opinion they appear to be, we may conſider each as the retina of the ſurface behind which it is placed: but it will always remain to be explained, how the light can act on this retina, through a coat of opaque pigment.

“This multitude of filaments, perpendicular to the cornea, have behind them a membrane which ſerves them all as a baſe, and which is conſequently nearly parallel to the cornea; this membrane is very fine, and of a blackiſh colour, which is not cauſed by a pigment, but extends to its moſt intimate texture; we obſerve in it very fine whitiſh lines, which are tracheæ, and and will produce ſtill finer branches, that penetrate between the hexagonal filaments, as far as the cornea. By analogy, we may name this membrane the *choroides*.

“A thin expanſion of the optic nerve is applied to the poſterior part of the choroides. This is a real nervous membrane, perfectly ſimilar to the retina of red-blooded animals; it appears that the white filaments, which form the particular retinæ of the different ocular ſurfaces, are productions of this general retina, which perforates the membrane I have named choroides, by a multitude of ſmall and almoſt imperceptible holes.

“To obtain a diſtinct view of all theſe parts, it is neceſſary to cut off the head of an inſect that has the eyes large, and diſſect it poſteriorly; each part will then be removed in an order the reverſe of that in which I have deſcribed them.

“In the cray fiſhes, in general, the eye is ſituated on a moveable tubercle. The extremity, which is rounded on every ſide, and ſometimes elongated into a cone, when viewed by a glaſs, preſents the ſame ſurfaces as the eyes of inſects. When we cut this tubercle longitudinally, we obſerve that the optic nerve paſſes through it in a cylindrical canal, which occupies the place of its axis. Arrived at the centre of the concavity of the eye, it forms a ſmall button, which detaches very fine filaments in every direction; at a certain diſtance theſe filaments meet the choroides, which is nearly concentrical with the cornea, and covers the ſpherical bruſh of the extremity of the nerve, like a hood. All the diſtance between the choroides and the cornea is occupied, as in inſects, by white filaments, cloſely arranged in a perpendicular direction to each other, and which have the extremity next the cornea alſo coated with a black pigment.

Cuvier's Lectures, vol. ii.

“Theſe filaments perforate the choroides, and are continuations of thoſe produced by the button, which terminates the optic nerve.”

99
Immediate ſeat of viſion probably the retina.

The immediate ſeat of viſion is ſtill in diſpute; but it appears to be the expanſion of the optic nerve upon the inner coat of the eye. The other parts of that organ ſerve to collect, refract, abſorb, and ſometimes even reflect, the rays of light, according as theſe operations are required for the diſtinct viſion of any particular animal. Thoſe animals that ſeek for their prey during night, have a pupil that is very dilatable, and have very little of that dark ſubſtance called *pigmentum nigrum*, that lies between the retina and the choroid coat in diurnal animals. Thus, the former have their eyes better adapted to receive and to retain the feeble rays of light, and thus poſſeſs a great advantage over the animals which they purſue, whoſe eyes are calculated for ſeeing beſt in a ſtrong light.

The ſubject of viſion has been ſo fully conſidered under Optics, Part I. ſect. 5. that it is unneceſſary for us to give any detailed account of it here. We ſhall therefore merely enumerate the principal phenomena.

100
Phenomena of viſion.

1. The rays of light proceeding from luminous bodies, are collected by the cornea; variouſly refracted by the aqueous, cryſtalline, and vitreous humours, till they meet in a point (in perfect viſion) in the retina, from which the ſenſation conveyed to the brain, excites there the ideas of light, colour, and other qualities of extreme objects, of which the eye is capable of judging.

2. The image of the object thus pictured on the retina, is inverted, though the mind is habituated to perceive it as if it were erect.

3. There is a certain point within the eye where the retina is deficient, and here the luminous rays make no impreſſion.

4. The eye is calculated to ſee objects moſt diſtinctly at certain diſtances or foci, though theſe diſtances vary conſiderably in different ſpecies, and different individuals. A perſon of ordinary ſight can read a middle-ſized print moſt diſtinctly at the diſtance of about eight inches. Thoſe who require a leſs diſtance are near-ſighted, or *myopes*, and in them the point of divergence of rays is before the retina. Thoſe who require a greater diſtance are long-ſighted, or *preſbyopes*; and in theſe the point of divergence is behind the retina.

5. In thoſe animals that have two eyes, an image of a luminous object is formed in each, though the mind is accuſtomed to unite both images into one. In ſtrabiſmus or ſquinting, the two eyes not being ſimilarly directed, do not concur in producing a ſingle object.

6. Though the images of many objects are impreſſed on the retina at the ſame time, the mind can attend diſtinctly to only one of them.

7. In perfect viſion, the pupil contracts or dilates according to the greater or leſs quantity of light that is preſent.

8. When the eye has looked ſteadily for ſome time on a circumſcribed ſpace, of a particular colour, as a piece of red paper placed on a white ground, it perceives a border of a different colour ſurrounding the original ſpot. This ſurrounding colour is called the *accidental* colour of the former, and differs according to the colour of the original ſpot. In the preſent inſtance it is green, or bluiſh-green. The other natural colours are attended by the following accidental colours, viz. ORANGE, by *blue*, with nearly an equal proportion of *indigo*; YELLOW by *indigo*, with a mixture of *violet*; GREEN by *violet*, with a mixture of *red*; BLUE by *red*, with a mixture of *orange*; INDIGO by *yellow*, with a conſiderable mixture of *orange*; and VIOLET by *green*, with a conſiderable mixture of *blue* (B).

(B) Dr Darwin, in his *Zoonomia*, vol. i. ſect. 2. employs the phenomena of accidental colours to prove that the

Of Senſation.

101 Requiſites for diſtinct viſion.

The exerciſe of diſtinct viſion depends chiefly on the following circumſtances: 1. The perfect tranſparency of the cornea, and the ſeveral humours of the eye; 2. on the juſt proportional diſtance between the cornea and the cryſtalline lens, and on their degree of convexity; 3. on the ſenſibility of the retina; 4. on the degree of illumination of the viſible object; 5. on the colour of the pigmentum between the choroid and the retina; and 6. on the contraction and dilatation of the pupil.

102 Action of light on the ſyſtem.

The action of light on living beings is not confined to its effects in producing viſion. It ſeems to act on the ſyſtem in general as a moderate but conſtant ſtimulus. When the light of day is vivid, as in bright ſunſhine, the body is more active, and the mind more vigorous, than under a cloudy ſky. Thoſe climates which are frequently obſcured by clouds and vapours, are notoriouſly the birthplaces of ſerioſneſs and gloom; and Bœotian dulneſs and Engliſh melancholy have long become proverbial; while on the contrary, the ſerene brightneſs of an eaſtern ſky has been conſidered as peculiarly favourable to the exertions of imagination, and the flights of fancy. Mr Stuart, a famous pedeſtrian traveller, told Dr Ruſh, that during a ſummer which he paſſed in a high northern latitude, where the ſun is viſible for ſeveral months together, he enjoyed an uncommon ſhare of health and ſpirits, which he attributed to the long continuance of the light of the ſun. In a ſtate of nature moſt animals retire to reſt when the light fails, and few people can ſleep ſoundly, unleſs light be excluded.

The ſtimulating effects of light are peculiarly evident on perſons whoſe nervous ſyſtem is unuſually ſenſible; they cannot bear ſtrong light, which not only hurts their eyes, but produces conſiderable agitation on their whole frame. The ſame effects are produced on thoſe who have been confined in a dark priſon. The countenance of theſe unfortunates is pale and ſallow. This latter effect of the abſence of light is ſimilar to what takes place in vegetables, as we know that the colour, taſte, and ſmell of plants depend on their being expoſed to a due degree of light.

103 Abſence of light ſuppoſed to favour obeſity.

It has been remarked, that thoſe animals which have been long confined in a dark ſituation, are univerſally diſpoſed to grow fat; and this has been found to take place even in condemned criminals, in whom we would leaſt expect it. This obeſity has been attributed chiefly to the abſence of light. We are diſpoſed to think that the abſence of this ſtimulus can have no immediate effect, but that the diſpoſition to obeſity depends rather on the indolence of the confined animals, which is favoured by the abſence of light.

For an account of the principal morbid affections of viſion, ſee Medicine, N° 81.

6. *Is there in ſome animals a ſixth ſenſe?*

104 Bats ſuppoſed to have a ſixth ſenſe.

From the experiments of Jurin and Spallanzani on the flight of bats that have been deprived of ſight, (ſee Mammalia, N° 38.) it has been ſuppoſed by ſome that the accuracy with which theſe animals in their flight avoided the obſtacles that were placed in their way, is owing to ſome additional ſenſe which they poſſeſs. Others have conceived that the ſenſe of hearing which appears to be very acute in the ſpecies on which theſe experiments were made, is ſufficient to ſupply their want of ſight. It is ſcarcely poſſible to aſcertain which of theſe two opinions is the more probable; but the writer of this article is rather inclined to adopt the latter, from having obſerved that when he was walking in an unfrequented ſtreet, when it was very dark, he was enabled to avoid running againſt the common ſtairs that projected into the ſtreet, from a certain ſenſation that he perceived, when he approached the wall of the ſtair, which he cannot better deſcribe than by ſaying that the air at theſe points appeared to be ſenſibly [illegible].

With reſpect to ſenſation in general, we may lay down the following laws, which are conſidered by Dumas as fundamental principles of this function.

105 Laws of ſenſation.

1. As activity is an eſſential character of ſenſation, this cannot exiſt without a certain action of the organs, and muſt be proportioned to the degree of attention beſtowed on the external objects, or ideas by which it is produced.

2. A repetition of the ſame ſenſations tends to render the ſenſibility leſs acute, and leſs capable of receiving new impreſſions. By repoſe its energy is reſtored.

3. As ſenſibility cannot be employed on two impreſſions at the ſame time, it muſt hold a certain balance throughout all the organs, and it cannot be acutely excited in one part, without being proportionably diminiſhed in another.

4. Senſibility is a relative faculty, which is not equally obedient to all kinds of excitations, but only to thoſe which have ſome relation to it in the different parts of the living body.

5. It is increaſed and accumulated in the direct proportion to the defect or weakneſs of ſtimulus.

6. It is not proportioned to the number, arrangement, or diſtribution of the nerves, and its changes of increaſe or diminution are not ſuſceptible of calculation.

7. It is inconſtant, variable in its progreſs, and unconfinable *.

To theſe we may add the following facts reſpecting this function and its organs.

1. The nerves which are principally diſtributed to the organs of the external ſenſes, ariſe from that part of the ſenſorium that is within the head.

2. The ſenſations produced in any part by the contact of external bodies, are more perfect, according as the nerves which terminate in that part ariſe more immediately from the common ſenſorium.

3. When a ligature is faſtened on a nerve, the parts on which the nerve is diſtributed are deprived of ſenſation as far as depends on that nerve.

4. Compreſſion of the brain diminiſhes general ſenſation in proportion to its intenſity. Slight compreſſion produces numbneſs.

5. Though ſenſation probably takes place only in the central parts of the ſenſorium, it is commonly referred to the extremities of the nerves. Thus, a gouty perſon who has loſt his leg, will ſuppoſe that he ſometimes

* Dumas, *Principes de Phyſiologie*, tom. ii. p. 151.

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fibres of the retina are thrown into contraction, like thoſe of muſcles, and that ſome of them act as antagoniſts to others; as he conſiders the accidental as the reverſe of the natural colours.

feels the pain of the gout in the toe of the amputated limb.

6. A ſympathy takes place between thoſe parts which are ſupplied by branches of the ſame nerve. Thus, a violent ſcratching of the head often produces ſneezing; powerful odours ſnuffed at the noſe produce a flow of tears; the head ſympathiſes with the ſtomach; the mammæ with the uterus, &c.

Theſe are all the phenomena reſpecting ſenſation which we can at preſent notice; we ſhall mention others when we come to conſider the relation between this function and thoſe of motion, digeſtion, circulation, &c.

106 Internal ſenſes belong to metaphyſics. What have been called the internal ſenſes, as memory, imagination, and judgement, are rather qualities of the mind, than operations of the brain; and the conſideration of them belongs rather to metaphyſics than phyſiology. To that article, therefore, we refer the reader; and we ſhall conclude this account of the phenomena of ſenſation with the following comparative view of that function in the inferior animals.

107 Comparative phyſiology of ſenſation. In all animals that have nerves, voluntary motions and direct ſenſations take place by the ſame means as in man. The differences in their motions depend partly on the intrinſic mobility of their fibres, and partly on the diſpoſition of their muſcles, and the parts to which they are attached.

The differences in their ſenſations depend on the number of their ſenſes, and the perfection of the organs belonging to each ſenſe. The animals that approach neareſt to man have their ſenſes equal in number to his. In certain ſpecies, ſome of theſe ſenſes are even more perfect in the ſtructure of their organs, and ſuſceptible of more lively and delicate impreſſions than ours; on the contrary, in proportion as animals are removed from us, the number of their ſenſes and the perfection of certain organs are diminiſhed; but perhaps ſome animals, at the ſame time, poſſeſs ſenſes of which we can form no idea.

We know not whether there are differences in the intrinſic ſenſibility of the nervous ſyſtem of different animals, i. e. whether an equal impreſſion made on an organ equally perfect, would affect every animal with the ſame force.

The animals next in order to man have, like him, ſpontaneous, or what we call internal, ſenſations. Images are excited in them at times, when they receive no immediate impreſſion from external objects. Thus, dogs and parrots dream. We are not certain, indeed, that the more inferior animals experience ſimilar ſenſations.

The paſſions produce effects in animals ſimilar to thoſe which they excite in man. Love is manifeſted in the ſame manner in all claſſes; fear occaſions a diſcharge of excrements in quadrupeds and birds; it makes them tremble, and even renders inſects immoveable; but the other animals afford fewer examples of theſe kind of phenomena than man, becauſe they are not maſters of their imagination, cannot direct it towards certain objects, and create for themſelves factitious paſſions. We are even ignorant whether their imaginations can, like ours, be wrought up to ſuch a pitch as to make them experience emotions of anger, deſire, or fear, from ſimple ideas or ſimple recollections; and whether the real preſence of the objects which cauſe theſe paſſions, is not always neceſſary to excite them in the inferior animals; we know, however, that thoſe which approach neareſt to us, the mammalia and the birds, have their ſorrows. The affliction they feel on the abſence or loſs of a companion, friend, or benefactor, is manifeſted by evident ſigns, in the ſame manner as they teſtify their attachment without any temporary inducement.

The ſame animals exhibit frequent proofs of a very perfect memory; ſome even appear to poſſeſs a certain degree of judgement. But does any thing ſimilar exiſt in the inferior claſſes, and particularly in the loweſt? Of this we ſhall probably remain always ignorant.

With ſo much reſemblance in the ſtructure of the nervous ſyſtem, in its mode of action, and in the number and ſtructure of the principal external organs, why is there ſo vaſt a difference, as to the total reſult, between man and the moſt perfect animal?

Is this owing to a more accurate proportion in the relative perfection of the external organs, ſo that one does not ſo much ſurpaſs another? Or has the internal organ, in which are performed all the intermediate operations between the ſenſation received and the movement executed, that is to ſay, the organ of perception, memory and judgement, greater differences than we have yet obſerved? Or, finally, is the ſubſtance by which theſe proceſſes are effected of a different nature? Theſe, however, are not anatomical queſtions.

The ſympathies or effects reſulting from the connections of nerves with each other, and the influence of the nerves on vegetative functions, are ſubject to the ſame laws in man and the other animals *.

108 Theory of ſenſation. The theory of ſenſation is perhaps more imperfect than that of any other function. On this ſubject we can derive little light from the ſtructure of the brain and nerves, accurately as this has been examined. Anatomy has taught us, that the principal part of theſe organs conſiſts of very delicate fibres, intermixed with a medullary pulp, and incaſed in membranes; and that they are furniſhed with a great proportion of blood-veſſels; but whether the ſeat of ſenſation reſides in the fibrous or medullary part, we cannot aſcertain.

109 Vibration. It was formerly the opinion, that the nervous power was propagated between the brain and the external organs, by vibrations of the nerves; but as the ſtructure of theſe chords, and their connection with ſurrounding parts, muſt wholly diſqualify them for ſuch vibrations, this theory has long been abandoned.

110 Nervous fluid. Another hypotheſis that has been very generally received is, that the nervous fibres are the conductors of a very ſubtile fluid, called the nervous fluid, the motions of which are the cauſe of ſenſation. This was the opinion of Dr Haller, (*Firſt Lines*, chap. x.) and was ſtrenuouſly maintained by Dr Cullen. We ſhall preſent our readers with the following modification of it, as given by an able diſciple of Cullen.

" It is probable, (ſays this writer), that in each nervous fibril, an elaſtic fluid is inherent, forming, from the moment of animation, a part of it; differing, however, according to the ſtate of the conſtitution, in power, mobility, and, perhaps, in other qualities. Of this fluid the nerves are conductors, and are ſurrounded in their courſe by non-conducting membranes, while the ſame membrane lines every part of the brain, and is carried into the deepeſt cavities, guarding with particular attention the ſlighteſt aperture. In this view ſanguiferous veſſels are chiefly uſeful in nouriſhing this medullary ſubſtance, and they appear to be neceſſary alſo in adapting the nerves to their office; for, when the circulation is greatly increaſed, the ſenſibility is more acute; and when it languiſhes, or is deſtroyed, the nervous energy ſoon ſhares the ſame fate.

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* *Cuvier's Lectures*, vol. ii.

"This fluid muſt neceſſarily be an elaſtic one; and impreſſions are apparently conveyed through it by vibrations. It does not follow from hence, that the nerves vibrate like muſcular cords; or that, in every the ſlighteſt motion, a portion is conveyed from the brain. The elaſticity of the fluid is proved from the momentary continuance of the impreſſion after the cauſe is removed; and vibration is a term employed in many branches of philoſophy as a means of communicating motion, without any diſtinct application. If we touch an object with a ſtick, or with a metallic rod, we perceive through it the impreſſion, and, in a general way, the nature of the ſubſtance. The impreſſion muſt be conveyed by ſomething; and whatever that ſomething is, it may as well convey impreſſions through the nerves as through the rod. But through the nerves only can it affect the brain, and produce an *idea*, or ſome change in the brain, or its fluid connected with the nature of the object, and which conveys to the mind ſome peculiar and diſcriminated impreſſion which it afterwards retains *."

A third hypotheſis, which is at preſent very faſhionable, is, that ſenſation is produced by a change in the ſubſtance of the brain and nerves. M. Cuvier is an advocate for this doctrine, which he illuſtrates in the following manner.

The nervous ſyſtem is ſuſceptible of two kinds of action; one which is confined to our ſenſitive faculty, and another which affects our vital and vegetative functions only. External ſenſations are produced by the impreſſions of external bodies, on our ſenſes; internal ſenſations, by changes which take place, in the ſtate of the internal parts of the body, to which the nerves are diſtributed; and ſpontaneous ſenſations are cauſed by a change in the nerves, or in the brain itſelf, without any external excitement.

Theſe circumſtances, added to the phenomena ariſing from the cutting or tying of nerves, ſhow, that ſenſation does not reſide in the external organs, but nearly in the centre of the nervous ſyſtem, and that the external organs ſerve only to receive the action of the external bodies, and to convey it to the nerves, by which it is propagated to a greater diſtance. They alſo demonſtrate, that this propagation is not produced by any matter or concuſſion, but by a change in the ſtate of the nervous ſubſtance. This change may ariſe from internal cauſes, or it may be produced by external cauſes, different from thoſe which uſually occaſion it. The nerves are not merely paſſive agents, nor the conductors or reſervoirs of any particular matter; but it appears, that the ſubſtance which produces ſenſation, is liable to be conſumed, or to loſe its activity by exertion.

There are phenomena which ſhew that the general ſuſceptibility of the nerves, for receiving ſenſations, may vary in conſequence of cauſes external to the nerves themſelves, and which can operate only by altering their ſubſtance. Certain medicines weaken or revive that ſuſceptibility;—inflammation frequently increaſes it to an exceſſive degree. Does this take place in conſequence of an increaſed ſecretion of the nervous matter? The moſt remarkable change that occurs in the ſuſceptibility of nerves, is ſleep. It is not unnatural to ſuppoſe that this change may be occaſioned by the temporary loſs of the ſubſtance which is eſſentially ſenſitive. But how does it happen that ſleep depends, in a certain degree, on the will? Why do we awake ſuddenly, or from cauſes which do not appear calculated to reſtore that ſubſtance? Why does cold produce ſleep? From theſe obſervations, may it not rather be ſuppoſed that this ſtate is the effect of a change in the chemical nature of the nervous ſubſtance?

But whether the ſubſtance contained in the nerves is exhauſted by ſenſations, or whether it merely undergoes an alteration in its chemical compoſition, and becomes, as it were, neutralized, it muſt remain in the nerve throughout the whole of its courſe, and leave it only at one of its extremities. It does not, however, reſemble the blood in the veſſels, either as to the manner in which it is retained, or in which it moves in the nerve. There is no evidence of the nerves being tubular. No phenomena indicate that any matter eſcapes from them when they are divided. Beſides, what veſſels could have parietes ſufficiently compact to retain ſo ſubtile a fluid as that of the nerves muſt be. It is far more probable that it is retained in the nerves, in the ſame manner as the electric matter is in electric bodies, by communication and inſulation; and that the nervous ſyſtem is its only conductor, while all the other parts of the animal body are, with reſpect to it, cohibent ſubſtances *.

The theory of *ſenſorial power*, brought forward by Dr Darwin, has already been noticed.

CHAP. III. *Of Irritability.*

III
General phenomena of Irritability.

1. WHEN any part of a living animal body that contains muſcular fibres, as a part of its compoſition, is touched with a ſharp inſtrument, with a hot iron, or with a corroſive liquor; or when a ſhock of electricity or galvaniſm is made to paſs through it, a contraction takes place in the part, and this contraction is diſcontinued when the ſtimulus is removed, but is renewed on repeating the application.

2. The ſame contractions take place in certain parts of a living animal body, from an exertion of the will.

3. Many parts in which the preſence of muſcular fibres has not been aſcertained, poſſeſs the ſame capacity of being excited to motion by ſtimuli. Such are the ureters, the biliary ducts, the ſmall blood-veſſels, and probably the lymphatics; all of which, though not evidently muſcular, have a fibrous ſtructure.

4. Some parts of the living animal body which appear rather nervous than muſcular, poſſeſs a contractile power, as the retina.

5. When the nerves which form a communication between a contractile part and the brain, in the higher orders of animals, are divided or compreſſed, thoſe parts which before contracted in obedience to the will, loſe this power; but,

6. Theſe parts, as well as every muſcular part, ſtill contract on the application of ſtimuli, particularly electricity and galvaniſm.

7. Such parts of an animal body as have muſcular fibres, are thrown into contraction on the application of ſtimuli, for ſome time after having been ſeparated from the living body, provided that nervous filaments remain connected with the muſcular fibres.

8. It has been found, that the fibrine of the blood is

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* *New London Medical Dictionary*, vol. i. p. 398.

* *Cuvier's Lectures*, vol. ii.

ſuſceptible of contraction on the application of the galvanic ſtimulus, after having been ſeparated from the living body.

9. In ſome animals in which a nervous ſyſtem has not been detected, as polypes, this contractile power ſeems to pervade every part of the animal.

10. Plants, in a greater or leſs degree, poſſeſs the power of moving on the application of ſtimuli; and in ſome ſpecies this motion is very remarkable. See N° 57.

The above are ſome of the principal phenomena which take place in organized beings with reſpect to irritability. They are ſo analogous, that we may attribute them to the ſame cauſe or the ſame vital power. This ſuſceptibilty of being thrown into contraction on the application of ſtimuli is called irritability; and it is poſſeſſed in a greater or leſs degree by every organized being with which we are acquainted.

112 Definition of irritability.

We have reſtricted the term *irritability* to denote the ſuſceptibility of the fibrous ſtructure to contraction on the application of ſtimuli; but it is proper to remark that this term has not always been uſed in the ſame ſenſe.

113 Different applications of this term.

Irritability has long been employed in medicine, as in common language, in reference to the paſſions, eſpecially that of anger; and this appears to have been the original meaning of the term.

> *Multa fero ut placem genus irritabile vatum.* Hor.

It is perhaps ſtill more common to apply it to a morbid ſenſibility of the ſyſtem; and we ſpeak of a perſon being of a very irritable habit, or poſſeſſing a great degree of irritability, when we mean to ſay that he poſſeſſes a more than ordinary ſhare of ſenſibility, liable to a more keen ſenſation of the ſame impreſſions.

> " Or are your nerves too irritably ſtrung."
> Armstrong.

Even the accurate Dr Whytt, to whom the proper diſtinction between irritability and ſenſibility muſt have been familiar, and by whom it is in general ſtrictly regarded, ſometimes falls into this inaccuracy. He ſpeaks, in his work on nervous diſeaſes, of " a delicate or eaſily irritable nervous ſyſtem." In fact, this confuſion of irritability with ſenſibility, appears to be a ſtumbling block to moſt phyſiological writers. We ſhall preſently inquire how far they are independent of each other.

The term irritability, in its moſt received acceptation, as a property of the muſcular fibre, ſeems to have been firſt employed by Gliſſon, about the middle of the 17th century. He diſtinguiſhes two kinds of irritability, primary or direct, and ſecondary or ſympathetic *. Haller was, however, the firſt, who treated of irritability with any degree of accuracy. He confines it to the muſcular fibre; though at the ſame time he will not allow it to many parts, the muſcularity of which has never been queſtioned, and which, ſince his time, have, by deciſive experiments, been proved to poſſeſs a conſiderable degree of contractile power. He completely diſtinguiſhes irritability from ſenſibility, with which he will have it to be totally unconnected; and he attempts to make a diſtinction between the irritability of the living, and that of the dead fibre †.

Dr Whytt, whoſe controverſy with Haller reſpecting the nature of irritability and ſenſiblity is famous in the annals of medical warfare, admits three kinds of irritability: 1. That power of alternate contraction and dilatation which is peculiar to thoſe organs we call muſcles; 2. That uniform contraction which takes place in the dartos (one of the coats of the ſcrotum) and the pores of the ſkin; and, 3. That redneſs and inflammation which is excited in every ſenſible part of the body, as often as acrid things are applied to it; although this laſt is allowed by him to be only an effect of the firſt kind of irritability taking place in the ſmall veſſels of the part ‡. Thus, he reduces the three kinds to two, and we may perhaps conſider his ſecond kind only as a modification of the firſt.

Among thoſe who ſeem to have a ſufficiently juſt idea of the nature of irritability, the word itſelf is not unfrequently miſapplied. Thus, Vicq d'Azyr ||, and Dumas §, in enumerating the functions of the animal body, called thoſe of motion and ſenſation, irritability and ſenſibility. Theſe latter are powers or capacities of living beings, and as ſuch ſhould be diſtinguiſhed from the functions that depend on them.

114 Stimuli exciting irritability.

In conſidering the phenomena of irritability, it is neceſſary to take notice of the ſeveral kinds of ſtimuli which excite it. Theſe have been reduced by Cuvier to five orders, viz. *volition; external actions* operating on *nerves; external actions* operating on the *fibre* itſelf; *mixed actions* operating on both the *nerves* and *fibres*, and certain *diſeaſes* or *violent emotions*.

115 Volition.

When the animal body is in a ſtate of health, and awake, the will exerciſes a prompt and conſtant influence over the greater part of the muſcles, which, on that account, are denominated *voluntary* muſcles. A ſmall number of muſcles, viz. thoſe which produce the internal movements neceſſary to life, and which cannot be interrupted, ſuch as the heart and the alimentary canal, are not ſubject to the will. It muſt be obſerved, however, that ſome of the muſcles, that in man and moſt other animals are involuntary, are ſubject to the will in others. This is the caſe with the ſtomach in ruminating animals, the movements of which may be exerted at pleaſure in two different directions. In ſome muſcles, as in thoſe of reſpiration, there ſeems to be a mixed action with reſpect to the will, as this faculty can interrupt their motion for a time, though, in general, this is continued from habit, without the will, or even conſciouſneſs of the animal. Thoſe muſcles that are abſolutely involuntary, are continually excited by an extraneous irritating cauſe; for the blood which is brought to the heart on every dilatation, determines that organ to contraction, and the alimentary canal is affected in the ſame manner by its contents. It ſeems, therefore, that the will is not eſſential to the action of theſe muſcles, and that it cannot interrupt their motion (c).

* *Gliſſon de Ventriculo et Inteſtinis.*

† *Haller's Firſt Lines of Phyſiology*, chap. 11.

‡ *Whytt's Phyſiological Eſſays*, Eſſay ii. part 2.

|| *Encyclop. Method. Anatom. Comparée.*

§ *Principes de Phyſiologie*, tom. i.

(c) There are facts which ſhew that the will has often conſiderable influence even on muſcles that are univerſally ſtyled involuntary. The abbé Fontana, when making experiments with *wheel polypes*, was led to believe that the heart, in theſe animalcules, is a *voluntary* muſcle, and from this belief he learned, in ſome degree, to accelerate

A muſcle laid bare, and expoſed to an irritating cauſe, will contract itſelf, even in the living ſubject, without being influenced by the will. It ſhould ſeem, therefore, that though the muſcles which we call voluntary, are uſually put in motion by the will, they may yet be excited to action in oppoſition to that faculty.

116 Nervous energy.

The will itſelf ſeems to act only through the medium of the nerves; and it is found that thoſe nerves which ſupply the voluntary muſcles, are generally the largeſt.

117 External ſtimuli.

The external ſtimuli that act on the muſcular fibre through the medium of the nerves, and on the fibre itſelf, are chiefly of a mechanical and chemical nature, as concuſſions, punctures, lacerations, all of which are capable of producing convulſive motions in all the muſcular parts to which the nerves extend.

118 Galvaniſm.

One of the moſt remarkable of theſe ſtimuli is the galvanic influence. It is well known that the experiments by which this influence is made to act on the muſcular fibre, conſiſt in eſtabliſhing between a muſcle and the trunk of the nerves which extend to it, an external communication with one, or a ſeries of ſubſtances placed cloſe to each other. Metals are not the only means that may be employed in this operation; and in general, the conductors are not the ſame as thoſe of electricity. Experiments have ſometimes been ſucceſsfully performed, when an interval was left in the ſeries of excitators: this circumſtance, in the opinion of Cuvier, proves the exiſtence of an atmoſphere.

The moment the contact takes place, the muſcle ſuffers violent convulſions. Theſe experiments ſucceed on the living body, or animals recently dead, and even on parts ſeparated from the body, preciſely in the manner of thoſe which Haller accounts for on the principle of irritability. Neither pointed inſtruments nor acrid liquors are neceſſary; and the galvanic experiments even ſucceed when theſe means have failed.

119 Diſtenſion.

Diſtenſion has been obſerved to have a powerful effect in exciting irritability.

120 Violent paſſions.

Violent paſſions may, to a certain degree, be conſidered as the acts of the will ſtrongly excited. Theſe, in ſome caſes, have an influence even on the involuntary muſcles; for it is no unuſual thing for palpitation of the heart, and ſometimes even a ſuſpenſion of its motion, to be the conſequence of ſtrong paſſions. Theſe actions, however, are to be prevented by moderating the exceſs of ſenſibility by which they are occaſioned. Even in nervous diſeaſes, which appear to be the leaſt connected with thoſe paſſions whoſe influence is more immediately felt, the will is often capable of preventing or retarding the approach of nervous ſymptoms, when the patient is determined to reſiſt the paroxyſm.

From what has been ſaid, it appears that, in the ſuperior claſſes of animals, all the orders of ſtimuli, either act through the medium of the nerves, or that they are capable of being modified or controuled by the will, the exertion of which depends on nervous influence.

121 Cauſe of irritability.

With reſpect to the immediate cauſe of irritability, there have been ſeveral opinions. One of thoſe which has been moſt generally received is, that irritability is intimately connected with ſenſibility; or, that it is an immediate effect of the nervous power. This was the opinion of Whytt and Cullen, the former of whom endeavours to prove it by the following arguments.

122 Whytt's arguments in ſupport of nervous influence.

1. We almoſt always obſerve the irritability of the muſcular organs of the human body to bear a proportion to their ſenſibility. Thus, children, and people of delicate nerves and very quick feelings, are moſt ſubject to convulſive and ſpaſmodic diſeaſes, while on the other hand old people, and thoſe of leſs delicate ſenſibility, have a muſcular ſyſtem that is not ſo irritable.

2. Whatever increaſes the ſenſibility of the muſcles, alſo increaſes their irritability.

3. Whatever leſſens or deſtroys the ſenſibility of the muſcles, alſo leſſens or deſtroys their irritability or power of motion.

4. That the motions of irritated muſcles are owing to the ſenſation excited by the ſtimulus applied to them, Dr Whytt thinks highly probable, if it be conſidered that we are in fact conſcious of many involuntary motions in our own bodies, proceeding from a particular ſenſation, either in the organs moved, or in the neighbouring parts. *

Dr Cullen was ſo fully convinced of the neceſſity of nervous influence to produce muſcular contraction, that he conſidered the muſcular fibre to be only a continuation of the nervous fibre. See MEDICINE, N° 73.

123 Haller's opinion of the *vis inſita.*

Haller, as we have ſaid, ſtrenuouſly maintained, that irritability was quite independent of the nerves, and was an inherent power or *vis inſita* of the muſcular fibre. Indeed there are ſeveral circumſtances which would induce us to believe that irritability is at leaſt, in ſome caſes, independent of nervous influence. We have ſeen (N° 111.) that it takes place in thoſe animals in which there is no appearance of nerves; and that it is very remarkable in ſome ſpecies of vegetables, in which none but the moſt fanciful phyſiologiſts have dreamed of finding a nervous ſyſtem. Nay, it appears that the fibrine of the blood, which we can ſcarcely ſuppoſe to be affected by the nervous power, when taken out of the body, is ſtill ſuſceptible of imitation.

124 General concluſion on this ſubject.

From a compariſon of all theſe circumſtances, we muſt either conclude, that the irritability of living muſcles, and of the ſuperior animals, is different from that of the fibrine, of polypes and plants; or, if we admit that nervous influence is eſſential to irritability, we muſt alſo allow that this influence deſcends to the latter claſs of organized bodies.

125 Chemical doctrines of irritability.

Before we quit the ſubject of irritability, we muſt notice the chemical hypotheſes that have been lately propoſed, to explain the immediate cauſe of this faculty.

126 Girtanner's opinions.

The firſt of theſe is that of Girtanner, who conſidered oxygen as the principle of irritability. The arguments

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celerate and retard the motion of his own heart. We have even heard of a perſon who had ſuch a command over both heart and lungs, that he could, at pleaſure, arreſt the motion of both, and aſſume all the appearance of a lifeleſs corpſe. Many of thoſe muſcles, which, in ordinary ſubjects, are not obedient to the will, as thoſe of the *noſe* and *external* ear, may, however, become ſo by habit or patient aſſiduity in cultivating their action.

* *Phyſiological Eſſays*, Eſſay ii.

arguments on which he founded this opinion are the following.

1. The irritability of organized bodies is always in a direct ratio to the quantity of oxygen they contain.

2. Every thing that augments the quantity of oxygen in organized bodies augments at the ſame time their irritability.

3. Every thing that diminiſhes the quantity of oxygen diminiſhes likewiſe their irritability.

He diſtinguiſhes the organized fibre by three different ſtates:

1. A ſtate of health, or the *tone* of the fibre, in which the oxygen exiſts in its proper quantity.

2. A ſtate of *accumulation*, in which the fibre is overcharged with the oxygen or irritable principle.

3. A ſtate of *exhauſtion*, in which the fibre is more or leſs deprived of it.

He likewiſe arranges the ſubſtances, that are capable of coming into contact with the irritable fibre, into three claſſes.

The firſt comprehends thoſe ſubſtances that have the ſame degree of affinity for the irritable principle or oxygen, as the organized fibre itſelf; hence the ſubſtances produce no effect upon it.

The ſecond comprehends thoſe ſubſtances that have a leſs degree of affinity for oxygen than the organized fibre has: hence theſe, when they come into contact with it, ſurcharge it with oxygen, and produce a ſtate of *accumulation*. They are called negative ſtimuli.

The third comprehends ſubſtances for which oxygen has a greater affinity than it has for the organized fibre. Theſe, therefore, deprive the fibre of its oxygen, and produce a ſtate of exhauſtion. They are called poſitive ſtimuli.

By way of anſwer to this fanciful doctrine, we may obſerve, that if oxygen were ſo eſſential to irritability as is ſuppoſed in Girtanner's poſitions, thoſe animals which reſpire moſt oxygen ſhould poſſeſs moſt irritability, and thoſe which are capable of living for a long time in deoxygenated air, ſhould have their irritability very low. Now, the reverſe of this is found to take place. The muſcular fibres of birds which reſpire more oxygen than moſt other animals, poſſeſs but little irritability, while reptiles and worms, which can live for a long time without oxygen, are univerſally and ſtrongly irritable *.

127
Hypotheſis of Humboldt.

The other opinion is that of Humboldt, who conſiders the galvanic fluid as the ſource of nervous power, and the primary cauſe of irritability. He lays down three principles as neceſſary to excite irritability; viz. 1. Oxygen, which forms combinations with different acidifiable baſes. 2. The acidifiable baſes (carbone, hydrogen, azote, and phoſphorus,) of the fibre, with which the oxygen may combine. And 3. The galvanic fluid.

The galvanic fluid produces, according to Humboldt, the ſame effect in the animal economy, as the electric fluid in the mixture of azote and oxygen. It is this galvanic fluid that, being conveyed by the nerves, brings about the combinations of the oxygen with the different acidifiable baſes of the fibres; but when the nerve of a part is tied, it prevents the fluid from paſſing, which explains the reaſon of the irritability being deſtroyed.

The oxygen neceſſary for theſe unions is carried by the arterial blood in the courſe of circulation; and the acidifiable baſes, which are to unite with it, are found to be already preſent in the fibre.

He found that every thing that augments too much the quantity of the acidifiable baſes diminiſhes the irritability; and that every thing that increaſes too much the quantity of oxygen, likewiſe diminiſhes it; and he thinks it very probable, that the ſame takes place with reſpect to the proportion of the galvanic fluid.

It is therefore only in a juſt equilibrium of theſe principles that the neceſſary irritability of the parts conſiſts.

Upon theſe principles this philoſopher thus explains the production of muſcular motion. "In a ſtate of repoſe, the nerve being inſerted in the muſcles, the galvanic fluid is put into equilibrium in organs that touch each other. The ſpontaneous motion is made by a ſurcharge of galvanic fluid into the nerve. It appears that the inſtant we wiſh to make a motion, the galvanic fluid produced in the brain, is carried *en maſſe* towards the part that ought to move, and ſurcharges the nervous fibres. A diſcharge from the nerve is then made into the muſcles. The particles of theſe laſt, animated by increaſed affinities, approach each other, and it is this that conſtitutes the phenomena of muſcular motion *."

Dumas lays down the following fundamental laws reſpecting animal irritability.

128
Laws of irritability by Dumas.

1. The eſſential characteriſtic of irritability conſiſts in a ſeries of contractions and dilatations, determined either by the impreſſion of an external ſtimulus, or by the ſimple exertion of the will.

2. Irritability is independent of the action of the nerves; and though generally diffuſed throughout the animal organization, it belongs rather to the muſcular fibre than to any other ſtructure. Its action is in proportion to the number of fibres upon which the irritating cauſes can exert their influence.

3. Irritability is a relative faculty which is not indiſcriminately obedient to every ſpecies of excitation, but only to thoſe which have ſome relation to it in the different parts of the living body.

4. There belongs to each organ a ſpecific irritability which requires a peculiar ſtimulus, accommodated to its nature, and to the kind of functions which it exerciſes.

5. Irritability has certain viciſſitudes of diminution and increaſe, which vary in the different ſpecies of animals, in the different organs of the ſame animals, and under the different circumſtances that ſucceſſively occur in the life of an individual.

6. Irritability is developed with moſt energy at the moment of death, and immediately after this has taken place.

7. It is multiplied and revived in proportion as the organ which has loſt it is divided into a greater number of pieces.

8. It diffuſes itſelf in each part with a velocity proportioned to the activity, number, and duration, of the irritations by which it is excited.

9. There exiſt mutual relations with reſpect to influence between ſenſibility and irritability, though each of them is eſſentially diſtinct from the other.

10. The exerciſe of this faculty ſuppoſes in the organs a moderate degree of coheſion, above or below which the action of this force is enfeebled, obſtructed, or oppoſed *."

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* *Johnſon's Animal Chemiſtry*, vol. iii.

* *Johnſon's Animal Chemiſtry*, vol. iii. p. 24.

* *Principes de Phyſiologie*, tom. iii p. 53.

Chap. IV. *Of Animal Motion.*

129 Organs of motion.

The organs of motion vary conſiderably in their nature and connection in the different claſſes of animals. In ſome tribes, as in the animalcules and polypes, no diſtinct organs can be obſerved. In all above theſe, however, there are evident muſcular fibres, and in many there are hard parts or ſtrong membranes, which ſerve as points of attachment and fulcra of motion to theſe fibres. The muſcular fibres are to be conſidered as the eſſential moving organs, while the parts to which they are attached are merely the paſſive functions of this organ. It would be out of place here to enter on a comparative account of the organs of motion; and there is the leſs occaſion for it, as they have been more or leſs fully deſcribed in the former part of the work. The bones, ligaments, muſcles, and tendons, with their appendages, as they appear in man, have been amply deſcribed in the firſt and ſecond chapters of the Firſt Part of ANATOMY; and thoſe of other animals have been briefly noticed in the Second Part of that article. Such of our readers as wiſh for a more particular account, may conſult Cuvier's Lectures vol. i. or Blumenbach's Comparative Anatomy, chap. 1, 2, 3, 4, 5, and 22.

130 Principles of muſcular action.

Many of the phenomena of muſcular motion, as they take place in man, have alſo been related under ANATOMY, N° 85 and 86. We ſhall here therefore only enumerate and briefly illuſtrate theſe phenomena, and ſhall then proceed to conſider a moſt intereſting part of the phyſiology of motion, the progreſſion of different animals.

Dr Barclay, in his late excellent work on the muſcular motions of the human body, has conſidered the general ſubject of muſcular action under the following heads, which may be conſidered as fundamental principles.

1. Fleſhy fibres that are continued into tendon by a ſtraight line, ſhorten the muſcle which they compoſe, in the ſame degree in which they ſhorten themſelves; thoſe fibres which enter the tendon obliquely, ſhorten it more, and ſtill more in proportion to their degree of contraction, as they deviate more from the line of the tendon, and approach nearer to the perpendicular, in which laſt direction they would ſhorten the muſcle moſt with the leaſt contraction.

Plate CCCCXVII. Fig. 1.

This may be illuſtrated in the following manner. Let AB (fig. 1.) repreſent a tendon, and CD a fleſhy fibre; and let us ſuppoſe that AB is the diameter, and CD the radius of the ſame circle ADB. It is evident that if the fibre CD ſhould contract ſo as to bring the point C of the tendon to the point G in the ſtraight line, the extremities of the tendon A, B, (which are ſuppoſed to be moveable) would come reſpectively to E and F; and the ſituation of the tendon itſelf would be repreſented by the angle EGF. If the fibre could be ſuppoſed to contract ſo as to bring the point C to D, the two parts of the tendon CA and CB, would come in contact. If, on the other hand the fibre CH, which enters the tendon obliquely, were to contract to H, ſo as to bring the point C to H, the point A would be drawn but a little beyond the middle point C, ſo that although this latter fibre is contracted to as great an extent as the former, it has not brought the extremities of the tendon ſo near together.

2. When two fibres enter a tendon on oppoſite ſides and contract at the ſame time, they will draw the tendon in the diagonal, and the more nearly the angles which they form with the tendon approach to right angles, the more will the length of the muſcle be ſhortened in proportion to the degree of contraction of the fibres.

Fig. 2.

Let the fibres BC, BD, BE, BF, BG, (fig. 2.) be fleſhy fibres, inſerted into the tendon AB, at the point B, and let us ſuppoſe that all theſe fibres co-operate in bringing the point B to the point G, in the ſtraight line BG. Now the ſtraight fibre BG will be ſo much ſhortened when B comes to G, as to be obliterated, while the oblique fibres EB and FB will be ſhortened only to E*a* and F*b*, and the more oblique fibres CB and DB will remain of the length of C*c* and D*d*.

3. All muſcles that are inſerted into bones, are thereby furniſhed with levers, and as in the action of all levers there are alſo a fulcrum, a power, and a reſiſtance, theſe in different caſes will be differently ſituated with reſpect to one another.

a. In the motions of the head backward and forward on the atlas, the fulcrum is ſituated between the power and the reſiſtance; or the lever is of what is called in mechanics, the firſt kind. See MECHANICS, N° 33.

b. When the tibia reſts upon the aſtragalus, and the heel is raiſed by the muſcles of the calf of the leg acting on the tendo achillis, the reſiſtance (which in this caſe is the preſſure of the tibia) is ſituated between the power and the fulcrum, which are here reſpectively at the heel and at the toes; or the lever is of the ſecond kind.

c. In raiſing a weight at the palm of the hand, and bending the arm at the joint of the elbow, the power of action in this joint is ſituated between the reſiſtance and the fulcrum, which are here reſpectively at the palm of the hand and the *diſtal* extremity of the humerus (D), or the lever is of the third kind.

Fig. 3.

The ſhortneſs of the lever, and the conſequently great force of the muſcular power required to overcome the reſiſtance in this laſt caſe, may be thus illuſtrated. Let AB (fig. 3.) repreſent the *radius* articulated at B with the *humerus* BC; let DFE repreſent the *biceps flexor* muſcle running along the *humerus*, and attached to the *radius* at E; and ſuppoſe a weight W hung to the diſtal extremity A of the *radius*. Now, BH will repreſent the lever of reſiſtance, and BG perpendicular to it the lever of the muſcle, which is in this caſe extremely ſhort.

4. As, other things being equal, all muſcles produce a greater extent of motion by a leſs proportional degree of contraction, and conſequently a leſs proportional change in their fibres, than if they were ſhorter; thoſe muſcles which follow a direct courſe are ſeldom attached at the neareſt points of the two bones with which

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(D) In Dr Barclay's nomenclature, that extremity of a bone which is towards the trunk is called *proximal*, and that extremity which looks from the trunk is called *diſtal*.

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which they are connected. Hence, beſide the advantages already mentioned, relations are thus formed between parts at a diſtance, and the mutual dependence of the functions and their organs is extended and ſtrengthened. On the contrary, thoſe muſcles that are not extended along the ſurface of the bones to which they are attached, are obſerved to follow an oblique direction, by which they acquire not only contractibility and length, but at the ſame time a ſhorter lever than if they had been inſerted at the ſame place with a leſs obliquity.

5. Of muſcles attached to ribs that are parallel, equally moveable, and at right angles to the vertebral column, thoſe that follow a direct courſe from one to the other, will act on each by equal levers, and make them approach with the ſame velocity; while thoſe that obſerve an oblique courſe will act on each by different levers, and make them approach with different velocities.

Fig. 4.

Let AB and CD (fig. 4.) repreſent two parallel ribs, articulated with the vertebral column at A and C, where they are equally moveable; and let DB and DE be two muſcles, the former obſerving a direct, and the latter an oblique courſe. The levers of DB will be AB and CD, which, as AC is parallel to BD, are evidently equal; but the levers of DE will be CF and AG, which being of different lengths, the muſcle muſt act with different degrees of force on the different ribs, ſo that it will make CD, on which it acts with the longeſt lever, approach AB, faſter than it will make this latter approach the former.

Corollary.—When bones are not parallel, the muſcles that croſs in the interval between them, muſt fall obliquely on both, as it is impoſſible for a ſtraight line to be at the ſame time perpendicular to two other lines, unleſs theſe be parallel.

6. As all bones move on a centre or axis of motion, while the muſcular attachments move in a circumference, the muſcles, in changing the relative poſition of any two bones, muſt at the ſame time, be changing the direction of their own action, and varying their lever.

Fig. 5.

Let AB and CD (fig. 5.) repreſent parts of two parallel ribs, and let AB be moveable on the centre A, and let CF and GE be two muſcles inſerted obliquely into AB at F and E. Now ſuppoſe that by the action of theſe muſcles, AB is brought into the poſition A *b*. The points of attachment of the two muſcles to AB, will now be *f* and *e*, and the muſcles will be C *f* and G *e*, having changed their length, ſituation, obliquity, and lever.

7. All muſcles where the points of attachment move in a circle, draw either towards the centre, or towards the circumference.

8. If any two bones could, by the action of their muſcles, be made to approach in a parallel direction, the oblique muſcles attached to their parallel and approaching ſurfaces, would perform a greater extent of motion with a leſs ſhortening of their fibres, than any ſtraight muſcles attached to the ſame parallel ſurfaces.

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Fig. 6. &c.

Let AB and CD (fig. 6. and 7.) be parts of two ribs that are parallel, and that will continue parallel till they are brought in contact by the action of the ſtraight muſcles AC, EF, and BD, or by the action of the oblique muſcles CE and DE (fig. 7.) and FA and FB (fig. 6.). It is evident, that when the point E comes in contact with F, the length of the ſtraight muſcles muſt be obliterated, while that of the oblique muſcles will only be ſhortened by *c* E and *d* E in fig. 7. and *f* A and *g* B in fig. 6.

9. As, however, no two bones can approach one another in a parallel direction, at leaſt by the action of a ſingle muſcle, and as no muſcle can continue to act in a direction perpendicular to their two approximating ſurfaces; a muſcle entering them at right angles, when they are parallel, may be placed ſo near to the centre of motion as to carry the bones through a given ſpace, with a leſs ſhortening of fibres than any oblique muſcle that has the ſame origin, but is inſerted at a diſtance, and acts through the medium of a longer lever. Further, a muſcle with a leſs obliquity may be ſo ſituated as to carry the bones through a given ſpace, with a leſs ſhortening of fibres than any other muſcle of the ſame origin, but of a much greater obliquity.

Fig. 8.

Let AB and CD (fig. 8.) be two ribs, of which AB is moveable about the centre A; and ſuppoſe that by the ſhortening of the ſtraight muſcle EF, and of the two oblique muſcles, EG and EH, AB is brought into the poſition A*b*. The points of attachment, after moving in the ſegments F*f*, G*g*, and H*h*, will now be reſpectively at *f*, *g*, and *h*. Now, on the centre E, with the radii E*f*, E*g*, and E*h*, deſcribe three different circular ſegments. The difference between the preſent and former lengths of the moſt oblique muſcle EH, will be *e*H, while the differences between the preſent and former lengths of the muſcles EG and EF, will be only *e*G and *n*F reſpectively.

10. The ſhortenings which any muſcle ſuffers in carrying round the point of its attachment through a given ſpace, will partly depend on the length of its lever, partly upon its degree of obliquity, partly on its drawing *peripherad* or *centrad*, and partly on its acting without or with a pulley (E).

11. The lever of a muſcle, which is varied with every degree of obliquity, is alſo varied by every change in the centre of motion. Where bones are connected by large ſurfaces, the centre of motion frequently ſhifts from one part to another; but in general it approaches towards that aſpect whither the bone is moving at the time; and as it advances, the muſcles recede, to increaſe their force.

a. The lever of reſiſtance, as well as of the power, is varied by the ſeveral changes of poſition; is ſometimes ſhortened at the time that the lever of the power is lengthened; and *vice verſa*.

If

(E) The terms *peripheral* and *central*, are employed by Dr Barclay, to denote the aſpects of any organ, according as they reſpect the *circumference* or the *centre* of the organ; and when the termination of theſe words is changed from *l* into *d*, they denote, like the other terms of his nomenclature, the direction in which the action of theſe parts is exerted. See Barclay's Anatomical Nomenclature.

If AB (fig. 9.) repreſent the radius, BC the humerus, DE the biceps flexor muſcle, and R the reſiſtance hung to the diſtal extremity of the radius, it will be evident that, when BA is, by the action of the flexor muſcle, brought into the poſition B*a*, the lever of reſiſtance will no longer be BA, but BH, equal to a perpendicular ſtraight line drawn from B, the centre of motion, to the plane of reſiſtance: and, as the lever of reſiſtance has been ſhortened, the lever of the muſcle has been proportionably lengthened. Were the radius to reſume its former poſition, the reverſe of theſe circumſtances would take place.

b. Sometimes again, the lever of the power and of the reſiſtance are lengthened or ſhortened at the ſame time.

Let AB (fig. 10.) repreſent the tibia, BC the femur, and DEF the cruræus muſcle; and that the femur, with the weight of the body, is to be raiſed to the ſituation B*c*; the centre of motion will, during extenſion, approach towards the muſcle at the rotular aſpect, while the plane of reſiſtance, as is evident from the figure, will be approaching to the centre of motion.

c. In the changes of attitude, while a bone is turning on its centre of motion, the centre itſelf is often at the ſame time deſcribing, either the ſegment of a circle, or a line compoſed of circular ſegments.

Let AB (fig. 11.) repreſent the foot, BC the *tibia*, CD the thigh bone, and DE the trunk; and let us ſuppoſe that it is required to bring the three laſt, by the action of their muſcles, to the perpendicular BF, ſo that BC ſhall occupy the ſituation of BG, CD the ſituation of GI, and DE the ſituation of IF; the point C on the centre B will move in the ſegment CG, and as C is changing its poſition in CG, the point D, which moves round the point C as its centre, will, if the extenſions be regularly performed in the ſame time, deſcribe ſuch a curve as DI; for as the point D muſt neceſſary move atlantad and ſternad, (F) in order to preſerve the centre of gravity, the general direction of its courſe muſt be known; and if CG be divided into equal parts, and at each of the diviſions a circle deſcribed with the radius CD, the points in DI, correſponding in number with the points in CG, and at equal diſtances in the ſternal direction, will each be found in the circumference of one of the circles deſcribed ſucceſſively round the point C as it paſſes along the ſegment CG.

In like manner, if the extenſions of CD and DE be regularly performed in the ſame time, the point E will deſcribe ſuch a curve as EF, the points in EF being in the circumferences of the ſeveral circles ſucceſſively deſcribed round the point D as it moves along the curve DI.

12. When we examine the ſtructure of the animal ſyſtem, we ſhall generally find that the motions of the bones, as produced by the muſcles, are the combined effects of different forces, and hence that a ſmall number of muſcles is enabled to produce, with ſteadineſs and accuracy, an almoſt infinite variety of changes *.

For more on the general ſubject of muſcular action, and for an account of the principal motions of the human body, we muſt refer to Dr Barclay's publication.

One of the moſt intereſting enquiries reſpecting animal motion, is that of the progreſſion of different animals, or of the powers of loco-motion.

121
Progreſſive motions.

Thoſe animals which poſſeſs the faculty of changing their place, exerciſe this faculty by very different organs. Some can only creep, as worms, and many molluſca; others can only ſwim, as all fiſhes, many of the molluſca, and ſome of the teſtacea. Moſt birds can both fly, walk, and run, while a few do not poſſeſs the power of exerciſing the firſt of theſe motions. All the mammalia, and moſt reptiles, properly ſo called, can walk, run, climb, leap, and perform a variety of other motions; and a few of the former claſs can imitate the flying of birds. We ſhall briefly examine the mechaniſm of theſe different actions, but by way of introduction, we ſhall firſt conſider how the action of ſtanding is performed.

122
Standing.

Standing, in moſt animals, is ſolely the effect of the continued action of the extenſor muſcles of all the joints, as is evident from the circumſtance, that if an animal, while ſtanding, ſuddenly dies, or in conſequence of ſome powerful cauſe, as a ſtrong electric ſhock, ceaſes to make the neceſſary efforts for preſerving the upright poſition, all the articulations of the legs yield to the weight of the body, and bend under it. In ſome animals, however, the extenſion of the muſcles is ſo much aſſiſted by powerful ligaments attached to the articulations of the legs, that they are enabled to continue ſtanding for a much longer time, and with much leſs fatigue than moſt others. This is the caſe with birds that perch, and it is particularly remarkable in the ſtork, which by means of this peculiar mechaniſm is able to ſtand on one foot for ſeveral days together.

The action of ſtanding is ſomewhat different, according as the animal ſtands on two feet or on four.

123
Standing on two feet.

That a body may be ſupported in a vertical poſition, it is neceſſary that it be ſo diſpoſed as to be in a ſtate of equilibrium, or that it be ſo balanced that a perpendicular line from the centre of gravity ſhall fall within its baſe. See MECHANICS, N° 193, et ſeq. It is evident that the more extenſive the baſe is on which the body ſtands, the leſs is the danger of its loſing its balance. Man can very eaſily preſerve himſelf in the vertical poſition, from the broad baſis formed by his feet, and from the great power he poſſeſſes of ſeparating theſe to a conſiderable diſtance. This latter depends chiefly on the greater weight of his pelvis, and the length and obliquity of the neck of the thigh bone, by which this bone is carried more outward, and removed farther in its articulation, than in any other animal. In man, too, the foot is peculiarly adapted to ſtand firmly on the ground, from the flatneſs of its inferior ſurface, and from having the heel bone ſo formed as to come in perfect contact with the ground. The muſcles that move the foot are alſo very advantageouſly inſerted, and the extenſor muſcles of the heel are proportionally thicker than in moſt of the mammalia.

The thigh of man, when in the erect poſture, is in a ſtraight line with the trunk and the leg, whereas in quadrupeds, it is ſituated cloſe upon the flank, and forms an acute angle with the ſpine. On this account, the thigh bone of quadrupeds is flat, and proportionally weaker than that of man. The extenſor muſcles of the thigh are proportionally ſtronger in man than in the other animals; and as the thigh bone moves upon the pelvis in every direction, theſe extenſors are in man ſo conſiderable, that he is the only animal that poſſeſſes what are properly called hips.

In conſequence of this ſtructure, the human femoral extenſors are furniſhed with a ſufficient baſe, and from very ſolid bodies for ſupporting the trunk. Man alſo poſſeſſes ſeveral advantages for maintaining the general equilibrium of the body, eſpecially the facility with which he holds his head in the erect poſture, owing to the poſition of the occipital bone, and the horizontal direction of the eyes and mouth. See the article MAN, N° 5 and 6.

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* Barclay on Muſcular Motions, Part ii. chap. 3.

The quadrupeds that ſometimes try to ſtand on their hind feet only, in order that they may either employ their fore feet in taking hold of ſome object, or avoid keeping their head too low, ſeem rather to ſit than to ſtand. Their trunk reſts at the ſame time on their hind feet, as far as the heel, and on the buttocks; it is ſtill neceſſary, however, that their head and neck ſhould be proportionally ſmall, as in *monkeys*, *ſquirrels*, *opoſſums*, &c. otherwiſe the weight of thoſe parts would be too great for the force employed in their elevation; but even when ſeated, the animal is generally obliged to reſt on the fore feet, as may be obſerved in *dogs*, *cats*, &c.

Some quadrupeds uſe their tail as a third foot, to enlarge the baſe of the body; and when it is ſtrong, it is capable of contributing to their ſupport for ſome time. We find examples of this in the *kangaroos* and *jerboas*.

We have already noticed the mechaniſm in the feet of birds, which enables theſe animals to ſupport themſelves on two legs, though they do not ſtand in a vertical poſition, and though the atlantal part of their bodies is advanced more beyond the centre of gravity than the ſacral part. Other advantages poſſeſſed by birds in this reſpect are, the great flection of the thigh bone and tarſus; the length of the anterior toes, and the length and flexibility of the neck.

134 Standing on four feet.

An animal which ſtands on four feet is ſupported on a very conſiderable baſe; but from the great weight of the head and neck in theſe animals, their centre of gravity is nearer to the atlantal than to the ſacral extremities (F). It is evident from this, that in quadrupeds, the former muſt ſuſtain almoſt the whole weight of the body; and we find, accordingly, that they are furniſhed with very ſtrong muſcles. In ſhort, all that the ſacral extremities ſeem to want in muſcular force, appears to be transferred to the atlantal.

As in moſt quadrupeds the head inclines towards the horizon, and the neck is often very long, very powerful means are required to ſuſtain the former. Theſe means are furniſhed by the great ſize and extenſive attachments of the muſcles of the neck, and eſpecially in many quadrupeds by the cervical ligament. In the *mole*, which employs its head to raiſe conſiderable burdens of earth, the cervical muſcles are peculiarly ſtrong, and the ligament is converted into bone.

The body of a quadruped hangs between the four legs, and by its weight tends to draw the ſpine downwards. This is counteracted by the abdominal muſcles, eſpecially by the ſtraight muſcles, which produce a curvature in the oppoſite direction. The abdominal muſcles act with peculiar force in arching the ſpine upwards in thoſe mammalia that are covered with ſcales or ſpines, and are accuſtomed to roll themſelves upon the approach of danger, as the *hedgehog*, the *armadillos*, and the *pangolins*.

Oviparous quadrupeds or reptiles, have their thighs directed outward, and the inflections of the limbs take place in planes that are perpendicular to the ſpine. In theſe, therefore, the weight of the body muſt act with a much longer lever, in oppoſing the extenſion of the knee-joints; and accordingly they have the knees always bent, and the belly dragging on the ground between their legs, whence their name of *reptiles*.

135 Walking.

In walking on a fixed ſurface, the centre of gravity is alternately moved by one part of the extremities, and ſuſtained by the other, the body never being at any time completely ſuſpended over the ground.

136 Walking on two feet.

Animals which can ſtand erect on two legs, ſuch as man and birds, walk alſo on two legs. But ſeveral quadrupeds that cannot ſtand on two feet but with great difficulty, may yet move in that poſture for ſome time with ſufficient eaſe. This ariſes from its being in general leſs painful to walk than to ſtand, the ſame muſcles not being continued ſo long in action. And alſo it is leſs difficult to correct the unſteady motions by contrary and alternate vacillations (a thing eaſy in walking), than it is to prevent them altogether.

When man intends to walk on even ground, he firſt advances one foot; his body then reſts equally on both legs, the advanced leg making an obtuſe angle with the tarſus, and the other an acute one. The ground not yielding to the point of the foot, the heel and the reſt of the leg muſt of neceſſity be raiſed, otherwiſe the heel could not be extended. The pelvis and trunk are conſequently thrown upward, forward, and ſomewhat in a lateral direction. In this manner they move round the fixed foot as a centre, with a radius conſiſting of a leg belonging to that foot, which, during this operation, continually diminiſhes the angle formed with the tarſus. The leg which communicated this impulſe is then thrown forward, and reſts its foot upon the ground; while the other which now forms an acute angle with its foot, has the heel extended in its turn, and in like manner makes the pelvis and trunk turn round upon the former leg.

As each leg ſupports the body in its turn, as in ſtanding on one foot, the extenſor muſcles of the thigh and knee are brought into action, to prevent theſe articulations from yielding; and the flexors act immediately after, when the leg having thrown the weight of the body on its fellow muſt be raiſed before it can again be carried forward. As the undulatory motion that neceſſarily attends a man's walking, cannot be perfectly regulated on both ſides, he cannot walk in a perfect ſtraight line, nor can he walk in a direct courſe with his eyes ſhut.

In walking down an inclined plane, or deſcending a ſtaircaſe, as the advanced leg is placed lower that that which remains behind, the extenſors of the leg muſt act more powerfully to prevent the body from falling backwards. Again, on aſcending ſuch ſituations it is requiſite at each ſtep, not only to tranſport the body horizontally,

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(F) Theſe terms ſignify the ſame as *ſuperior* and *inferior* in man, *anterior* and *poſterior* in quadrupeds; but are more convenient, as applying indiſcriminately to both. *Atlantal* denotes what is next the *atlas*; *ſacral* what is next the *ſacrum*. See *Barclay's Nomenclature*.

zontally, as on walking on level ground, but to bear it up againſt its own weight, by means of the extenſors of the knee of the advanced leg, and thoſe of the heel of that which is behind; this is the reaſon of the knee and calf of the leg being fatigued in aſcending; and the fatigue is relieved by inclining the body forward, becauſe then the lever by which its weight acts on the knee is ſhortened.

Running is only a ſucceſſion of ſhort leaps, and it will be underſtood from what we ſhall preſently ſay of leaping.

137 Walking on four feet.

When a quadruped walks, he firſt ſlightly bends the articulations of the hind legs, and then extends them, in order to carry forward the body, which motion is conſiderably aided by the extenſors of the knee and the heel. The trunk being thus thrown forward, the fore legs incline backward, and the animal would fall, did it not inſtantly throw them forward in order to ſupport itſelf. It then draws up the trunk upon the fore legs, and renews its former efforts.

In this walking, each ſtep is performed by two legs, one belonging to the fore, and the other to the hind pair. Sometimes they are of the ſame ſide, and ſometimes thoſe of oppoſite ſides. The motion of a horſe who ſteps forward in the latter way, is termed a pace.

In the animals that have the fore feet longer than the hind; and have their ſtrength chiefly in the anterior part of the body, the principal impulſe is given by extending the fore foot. The hind foot then riſes to follow it, and it is not until the moment that the latter extends itſelf in its turn, that the fore foot is raiſed. This is the manner in which the *giraffe* is ſaid to move.

But when the fore legs are conſiderably diſproportioned to the others, and particularly when the poſterior extremities are feebly and badly articulated, as in the ſloths, the animal is obliged to drag itſelf forward, by firſt extending the fore legs, and then bending them ſo as to draw the body after them. Hence the progreſſion of the ſloth is ſo laborious.

Thoſe animals which have their fore legs very ſhort in proportion to their hind legs, would be incapable of ſufficiently ſupporting their bodies, and muſt fall forward on each impulſe of the latter, had they not the precaution to make a preceding movement; that is, to raiſe the anterior extremities entirely off the ground, previouſly to their being impelled onward by means of the hind feet. Accordingly, ſuch animals cannot in propriety of language be ſaid to walk; they only move forward by leaps. This is the caſe with hares, rats, and particularly jerboas. Indeed, theſe animals cannot be ſaid to walk at all, except in the action of aſcending. When they attempt to walk ſlowly on level ground, they are obliged to move themſelves by the fore feet, and merely to drag after them the hind pair. This may be obſerved in rabbits, and ſtill more diſtinctly in frogs.

138 Leaping.

In leaping, the body riſes completely from the earth, and remains without any ſupport for a ſhort period, the duration of which depends on the force with which the leap has been made. This action is performed by a ſudden extenſion of all the muſcles belonging to the ſeveral articulations, immediately after they have undergone an unuſual degree of flection. By this general extenſion theſe articulations receive a violent motion, the impulſe of which is communicated to the center of gravity of the body, and it is thus projected with a determined velocity, which is more or leſs in oppoſition to its weight. The projectile force and extent of the leap depend on the proportional length of the bones, and ſtrength of the muſcles. Thoſe animals, therefore, leap beſt that have the ſacral extremities longer and thicker than the atlantal; as the *kangaroos*, *jerboas*, *frogs*, *altica*, *grylli*, *fleas*, &c.

Small animals leap proportionally much farther than the larger ſpecies; and we know of none whoſe muſcular ſtrength, in this way, can be put in competition with that of a flea, which on a moderate computation is known to leap to a diſtance of at leaſt 200 times its own length. The direction of a leap depends on the ſituation of the centre of gravity with reſpect to the member by which the impulſe is given. Hence, only man and birds can leap vertically, becauſe they alone have the trunk ſituated above the members by which the leap is effected. Quadrupeds, and moſt inſects, can only leap forwards; but ſpiders, which have ſeveral long feet on each ſide of their body, can alſo leap ſideways.

139 Running.

Running conſiſts of a ſeries of low leaps performed alternately by each leg. It differs from walking, in the body being projected forward at each ſtep, and in the hind foot being raiſed before the anterior touches the ground. It is more rapid than the quickeſt walk, becauſe the acquired velocity is preſerved, and increaſed at each bound by a new velocity. Running, therefore, cannot be inſtantaneouſly ſuſpended, though a ſtop may be put to walking at each ſtep.

In running, the animal inclines its body forward, that the centre of gravity may be in a proper poſition for receiving an impulſe in that direction from the hind leg; and it is obliged to move the fore leg rapidly forward, to guard againſt falling.

Man varies his manner of running, only by taking longer or ſhorter ſteps, or giving to this motion a greater or leſs degree of rapidity; but quadrupeds vary this motion by the different order in which they raiſe each foot, or bring it to the ground.

140 Trotting.

Trotting is a mode of running in which the feet diagonally oppoſite riſe at once, and fall at once, each pair alternately, but in ſuch a manner, that for a moment all the four feet are off the ground. This produces a regular motion, and the ſound of the animal's ſteps are heard two and two in ſucceſſion.

141 Galloping.

Galloping is a running motion in which the animal raiſes the anterior feet at each ſtep, and throws the body forward by the extenſion of the poſterior feet. When the two fore feet deſcend at the ſame time, and are followed by the two hind feet alſo deſcending together, the motion is called a *full gallop*, which is the moſt rapid a *horſe* can perform, and the only mode of running in *dogs*, *hares*, &c. In this kind of gallop the ſteps of the horſe are likewiſe heard by two beats at a time. The *common gallop* is when the two fore-feet are lifted unequally, and fall one after another. This may be divided into gallops in which the horſes footſteps are heard by a ſeries of three or four beats, becauſe the poſterior feet may fall to the ground either both together, or one after the other.

There are ſeveral kinds of animals which leap by the means of organs different from feet, but always by a ſudden extenſion of ſeveral articulations.

Serpents leap by folding their bodies into ſeveral undulations, which they unbend all at once, according as they wiſh to give more or leſs velocity to their motion; ſome may be aſſiſted by the ſcales of their belly, which they can elevate and depreſs, but only a few genera are capable of employing this means.

Some fiſhes alſo leap to the tops of cataracts by bending their bodies ſtrongly, and afterwards unbending them with an elaſtic ſpring.

The long tailed *cray-fiſhes*, particularly the *ſhrimps*, leap by extending the tail after it has been previouſly bent under the body.

The larva of the *fly*, vulgarly called the maggot, forms itſelf into a circle, contracts itſelf as much as poſſible, then ſuddenly unbending, darts forward to a conſiderable diſtance.

142 Climbing. The motion of climbing, ſo uſeful to many of the inferior animals, conſiſts in hanging from, and ſtrongly graſping any object ſuſceptible of being ſeized by the fingers, toes, or tail, and thus riſing, by ſucceſſive efforts, in a direction oppoſite to the animal's weight. From this explanation it is evident that thoſe animals which have the diviſions of their extremities moſt diſtinct and flexible, will be the beſt climbers; and accordingly we find that the animals called *quadrumanous*, as the apes, lemurs, and a few others, perform this action in the moſt perfect manner. Man is but an indifferent climber, as he can only graſp with his hands. In *opoſſums*, *ant-eaters*, and *ſloths*, one of the toes is diſtinct, like the thumb in man, apes, and lemurs; or elſe they have a conſiderable protuberance on the heel, which has the ſame effect. Many animals, as ſome of the *monkeys*, ſome ſpecies of *oppoſſum* and *ant-eater*, the *manis*, &c. have a very flexible prehenſile tail, which aſſiſts them in climbing. The animals of the cat genus have very ſharp talons, by which they are materially aſſiſted in this kind of progreſſion, as they enable them to adhere firmly to the bark of trees, &c. Creepers, nut-hatches, woodpeckers, and other climbing birds, ſupport themſelves in a ſimilar manner.

143 Flying. The motion of flying, by which an animal can ſupport itſelf for ſome conſiderable time in the air, can properly be ſaid to be performed only by birds: for though bats can imitate this motion with tolerable ſucceſs, and the galiopithecus, flying-ſquirrels, and flying-oppoſſums, appear to fly from one tree to another, the motion of the former cannot be ſupported for ſo long a time as that of birds; and the motion of the latter animals can be conſidered only as a leap, aſſiſted and prolonged by the oppoſition given to the air, by the membranous expanſion between their limbs.

When a bird deſigns to fly, it firſt darts into the air, either by leaping from the ground, or by throwing itſelf from ſome height. In the mean time it raiſes the whole of the wings which had till then remained folded, and which it unfolds in a horizontal direction by extending the bones. When the wings have thus acquired all the ſuperficial extent of which they are ſuſceptible, they are ſuddenly depreſſed, till they form, with the vertical plane of the body, an angle that is obtuſe upward, and acute downward. The reſiſtance which the air gives to this motion ſuddenly performed in it, produces a reaction on the body of the bird, and thus moves it forward as in ordinary leaps. This impulſe once given, the bird refolds the wings by bending the joints, and repeats its efforts by another ſtroke. As the velocity thus acquired in aſcending is gradually diminiſhed by the effect of gravitation, a moment occurs in which it ceaſes, and in which the bird tends neither to aſcend nor deſcend. If at this moment it gives a new ſtroke with the wings, it acquires a new aſcending velocity, by which it will be carried as far as before, and by repeating theſe efforts, it will aſcend in a uniform manner. If this ſecond ſtroke be made before the velocity firſt acquired is loſt, an additional impulſe will be received: and by a continuance of this action the bird will aſcend with an accelerated motion. If the wings do not vibrate when the aſcending velocity is loſt, the bird will begin to deſcend; and if it allow itſelf to fall down to the point from which it ſet out, it cannot aſcend as high as at firſt, but by a much ſtronger exertion of the wings; but if it ſeizes in the fall a point ſo ſituated that the acquired deſcending velocity, and the ſmall ſpace which it has to fall down reciprocally balance each other, it may, by a ſeries of equal vibrations, keep itſelf at the ſame height.

When a bird wiſhes to deſcend rapidly, as when it darts upon its prey, it altogether ſuppreſſes the vibration of its wings, and thus falls by its own gravity. While deſcending, however, it may ſuddenly break its fall by extending its wings, and this ſuſpenſion is called a *recover*.

We have as yet conſidered only the vertical flight of a bird. To fly horizontally, it muſt riſe in an oblique direction, and make a new movement of its wings, when it is ready to deſcend below the point from which it departed; but in this way it will not fly in a ſtraight line, but will deſcribe a ſeries of curves ſo very much depreſſed, that the horizontal will overcome the vertical motion. In order to aſcend obliquely, the bird muſt make quicker vibrations of its wings, and to deſcend in a ſimilar direction, the vibrations muſt be ſlower.

The deviations of flight to the right or left are chiefly produced by the unequal vibrations of the oppoſite wing; thoſe of the left wing carrying the bird to the right, and *vice verſa*. The more rapid the flight is forward, the greater is the difficulty of one wing ſurpaſſing the other in the velocity of its vibrations, and of courſe the deviation ſideways is the more difficult. Hence birds which fly with the greateſt velocity make large circles in turning.

The tail, when ſpread out, contributes to ſuſtain the poſterior part of the body. If it is depreſſed when the bird has acquired a progreſſive velocity, it preſents an obſtacle which elevates the poſterior part of the body, and depreſſes the anterior. If it is turned up, the contrary effect is produced. Some birds incline to one ſide, to aſſiſt them like a rudder, when they wiſh to change their horizontal direction.

The ſtructure of moſt birds peculiarly adapts them for rapid motion through the air, and for ſuſtaining themſelves in this element with the greateſt facility. See ORNITHOLOGY, N° 37.

144 Swimming. The action of ſwimming, like that of flying, nearly reſembles leaping, except that, like flying, the leap does not take place on a fixed ſurface. A great variety of animals, beſides fiſh, and moſt of the other inhabitants of the waters, are capable of ſwimming. This action is performed with conſiderable eaſe by ſeveral of the mammalia,

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malia, even by the bulky elephant, and the unwieldly hippopotamus; by many tribes of birds; by ſeveral reptiles and ſerpents, and by ſome inſects.

The organs employed by fiſhes, in making their way through the water, are their fins, tail, and air bladder; the two former exerting the neceſſary motions like the wings of birds, while the latter, by being compreſſed or expanded, cauſes the neceſſary changes in the ſpecific gravity of the body, and renders the animal more or leſs heavier. The ſwimming of fiſhes has been treated of [illegible] ICHTHYOLOGY, chap. iii. ſect. 3. to which we refer the reader.

The cetacea employ much the ſame means as fiſhes; but in them the principal efforts of the tail are made in a vertical direction, and the uſe of the air-bag is ſupplied by lungs, which they can compreſs and dilate at pleaſure, by the action of the diaphragm, or the intercoſtal muſcles. See CETOLOGY.

The ſwimming of mammalia, and of water birds, is performed by means of the legs and feet, which are uſed like oars, to propel the body forward by the reſiſtance which they make to the water in the contrary direction. Hence thoſe quadrupeds and birds that have flat or webbed feet, ſwim moſt eaſily, as the reſiſting ſurface is the greateſt. Of all the mammalia, man has the moſt occaſion to uſe his hands in ſwimming, on account of the greater proportional weight of his head.

Serpents, and the larvæ of ſuch inſects as ſometimes inhabit the waters, perform the action of ſwimming by rapid inflections of the body like an eel or a leech. The larvæ that are moſt commonly found in the waters are thoſe of the water *beetles*, the *hydrophilus*, the *day flies*, the *aquatic tipulæ*, and *gnats*.

145 No animal walks without legs, or flies without wings (if we except the flying fiſh, whoſe fins enable it rather to ſpring than fly); but there are many that ſwim without fins, and that leap and creep without any legs. The rapidity of movement is not proportioned to the number of inſtruments that are employed: if the ſport fiſh be obſerved to move ſlowly with one leg, the ſea-urchin moves ſtill more ſlowly with many thouſands; the oyſter moves by ſquirting out water; the ſcallop by the jerk of its ſhell, and when in the water it riſes to the ſurface and ſails before the wind.

Many animals are formed by nature to fly, walk, leap, and ſwim: the fate of thoſe is rather uncommon whoſe muſcles or feet are by nature attached to their integuments; the lobſter is obliged to throw off its ſhell, and the caterpillar all its feet, with the ſkins, and in that ſituation to remain ſtationary till it receive new inſtruments of motion.

146 Whoever has read the celebrated work *De Motu Animalium*, needs not to be told that, beſides the organs which are here mentioned, the form, the ſtructure, and even the ſpecific gravity of the body, as depending on the nature of the bones and muſcles, or as varied by air-veſicles and bubbles, with a great variety of other circumſtances, are neceſſary to explain the different phenomena of locomotion.

147 Vegetable motions.

As to vegetable motions, they evidently depend on external agents: the wings of ſeeds only fit them to be carried by the wind, their ſpecific gravity to float in the water, and their legs or tentacula to adhere to bodies that are in motion; the ſingular motions which have been aſcribed to ſleeping, to waking, to ſenſation, and volition, in the vegetable kingdom, ſeem only the conſequence of light, heat, moiſture, and ſuch ſtimuli, acting mutually or with ſome [illegible] influence: the opening and cloſing of the meteoric flowers are always correſpondent to the ſtates of the atmoſphere; and the opening and cloſing of the equinoctial and tropic flowers, to the light, the length or ſhortneſs of the day.

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148 [illegible]

The principal intentions of locomotion are to get [illegible] food, to ſhun danger, to promote intercourſe and [illegible] ſpecies.

There is perhaps no part of phyſiology which is more important than the relations which ſubſiſt between the different functions of the living body; but it is a part of the ſubject which is as yet but little underſtood. We regret that our limits will not permit us to pay all the attention to it which we could wiſh. We ſhall, however, briefly notice under each function, the principal relations that are found to take place between it and thoſe which have been previouſly conſidered.

149 [illegible]

Beſides the dependence which animal motion has, in its more remote cauſes, on the nervous ſyſtem, (See N° 111.) we find an evident ſympathy between theſe two functions in a variety of phenomena. A violent emotion or impreſſion on the nerves often throws the limbs into convulſive agitations; ſpaſmodic affections are relieved, or ſometimes removed, by the coming on of delirium; and theſe ſymptoms will alternate with each other: a compreſſion of the brain, or of ſome large nervous trunk, produces general or partial want of motion, and when this compreſſion is removed, the muſcles for the moſt part recover their uſual action; an attack of epilepſy is often preceded by the ſenſation of a ſtream of vapour commencing in ſome external part, and riſing to the brain. Theſe, and many other phenomena that might be mentioned, fully prove the ſympathy between the nervous and muſcular ſyſtems; and with this enumeration we muſt diſmiſs the ſubject.

CHAP. V. *Of Digeſtion.*

150 Appetite for food.

THE neceſſity of repairing the waſte of the body is [illegible] announced in all animals by the feelings of hunger and thirſt; the former of which intimates the occaſion for ſolid, the latter for liquid food. This imperious neceſſity overrules all the other affections of the vital principle, and every other appetite often remains ſuſpended till that neceſſity be ſatisfied. It is difficult to aſſign the final cauſe of theſe ſingular ſenſations, but probably our reſearches on that ſubject are rather curious than uſeful. Whatever be the ultimate end of theſe appetites, we readily perceive how much they are influenced by habit. We find that when we are accuſtomed to take food at particular times, the appetite, under ordinary circumſtances, always reminds us at theſe times, of the occaſion, whether real or apparent, for receiving a new ſupply. By this influence of habit ſome animals, eſpecially man, are accuſtomed to take ſeveral meals in a day, while others can faſt for days, or even weeks, together. The appetite for food alſo varies conſiderably at different ages. It is more lively and more imperious in infancy and early childhood, and in general in thoſe animals who have not yet acquired their full growth; it is on the contrary weaker in advanced age, and when the body ceaſes to [illegible]

[illegible]

increaſe in ſize. It is more frequently renewed in the ſtrong and healthy, and thoſe who are accuſtomed to laborious occupations or active exerciſes.

151 We know that in the natural ſtate of the animal body, the appetite for food is influenced by the nature of the aliment on which the animal is accuſtomed to ſubſiſt. Many animals live entirely on vegetable food, and theſe have no appetite for animal ſubſtances, and even reject theſe when offered to them. On the other hand, many tribes live entirely on animal food, and either refuſe vegetable, or, if obliged by neceſſity to employ it as food, do not appear to derive nouriſhment from it. We find, however, that it is in the power of habit to remove theſe appetites; that a horſe or a ſheep may be taught to live on animal food, while a dog or a cat may be ſupported entirely on vegetable ſubſtances. A few animals are capable of ſubſiſting on almoſt every kind of animal or vegetable ſubſtances,* or are omnivorous.

152 Plants and ſome animals live on water and air alone.

Many animals are capable of being ſupported by water and air alone. We know that ſeveral fiſhes, as the minow, the gold and ſilver fiſh, &c. will live for a long time in a veſſel containing pure water, and freely expoſſed to the air. Rondelet (a celebrated writer on fiſhes in the 16th century) relates a remarkable inſtance of this. He kept a fiſh during three years in a veſſel that was conſtantly full of very pure water. It grew to ſuch a ſize, that at the end of that time the veſſel could no longer contain it. Leeches are often kept for ſeveral years with no other nutriment but water, and that not very often changed. There is good reaſon to believe that the ſole food of plants conſiſts of water and air, and that the ſoil in which they grow anſwers ſcarcely any other purpoſe than that of preſerving and conducting thoſe neceſſary aliments.

153 It has been ſuppoſed that ſome animals are capable of ſubſiſting on matters that appear to contain no nutritious principles, ſuch as ſand, hair, and wool. Borelli long ago conceived this opinion, from obſerving that in many teſtaceous animals which he diſſected, the alimentary tube contained nothing but ſand. It has often been remarked, that horſes, cows, and ſheep, when deprived of their uſual nouriſhment, will lick their bodies, and ſwallow down the hair, or, in the caſe of ſheep, will tear off and ſwallow each others wool. If we conſider the nature of theſe ſubſtances, we think there is no reaſon to ſuppoſe that they anſwer any other purpoſe than diſtending the alimentary canal or ſtomach, and thus in ſome meaſure counteracting the effect of hunger.

The ſubject of food in general has been already treated of, under ALIMENT, and in MATERIA MEDICA, Part I. N° 17; and the function of digeſtion, as far as it relates to man, has been conſidered under ANATOMY, N° 106, 107, and under CHEMISTRY, N° 2518. It remains for us here only to make a few obſervations on the comparative phyſiology of this function.

154 Differences of digeſtion.

Digeſtion differs conſiderably in the various claſſes of animals, both as to the organs by which it is performed, and as to the ſimplicity or complex nature of the operation itſelf. The general variations that take place in the organs of digeſtion, have been mentioned under the comparative part of ANATOMY, N° 152, and are fully treated of by Cuvier, in his *Leçons d'Anatomie Comparée*, tome iii, and Blumenbach, in his *Comparative Anatomy*, chap. 6. and 7.

In the more perfect animals, digeſtion ſuppoſes a ſeries of operations, from the time that the food enters the mouth, till the nutritious parts of it are taken into the circulating ſyſtem. Theſe operations are, *maſtication*, *inſalivation*, *deglutition*, *chymification*, and *chylification*.

155 Maſtication.

Maſtication is performed by means of teeth, and therefore can ſcarcely be ſaid to take place in thoſe animals that are not furniſhed with theſe organs. We know that all mammalia except thoſe which Cuvier calls *edentata*, as the ant-eaters, pangolins, and platypus, have teeth, fitted both for dividing and chewing their food; but here an important difference takes place. Thoſe animals which live chiefly on animal food, have moſt of their teeth ſharp and pointed, for the purpoſe of ſeizing and tearing their prey, while the graminivorous and granivorous animals have very large and ſtrong grinders, in which the hard ſubſtance commonly called enamel (or what Blake calls *corpus ſtriatum*, *) forms alternate layers with the bony part. Such are alſo found in moſt reptiles and ſerpents, and in many fiſhes; but in ſome of theſe they ſeem leſs to ſerve the purpoſe of dividing the food, than to ſeize and retain it till ſwallowed. Birds have no teeth, though ſome of them have the mandibles of the bill ſo formed as to divide and cut in pieces their food.

156 Inſalivation.

During maſtication the food is mixed with the ſaliva, and is thus better fitted for eaſy ſolution in the ſtomach. This inſalivation of the food may, however, take place, without previous maſtication. It is common for ſerpents to ſwallow their food whole; but in order to facilitate its paſſage down the throat, they firſt beſmear it all over with their mucous ſaliva. In many animals, a proceſs ſimilar to inſalivation takes place, while the food remains in the mouth. In ſeveral ſpecies of the ape tribe there is a pouch ſituated on each ſide of the jaw, and in theſe pouches the greater part of the food is retained, not merely as ſome ſuppoſe, to ſerve as a future meal, but to undergo a dilution by the fluids that are there ſecreted. In granivorous birds, the food is firſt received into a membranous bag, formed by a dilatation of the gullet, and commonly called the *crop*, where it is macerated by the fluids that are there ſeparated by means of glands or exhaling veſſels, and paſſes down, as the animal requires, to be further prepared by the ſtomach. The buſtard, indeed, though a granivorous bird, has no proper crop, but the gullet is furniſhed with numerous and large glands.

For an account of the chemical nature and properties of ſaliva, ſee CHEMISTRY, N° 2723.

157 Deglutition.

The operation of deglutition depends chiefly on the action of the tongue, and on that of the muſcles which ſurround the pharynx and gullet. It is more or leſs ſpeedy in proportion as theſe are more or leſs active and vigorous. Moſt animals, after having once ſwallowed their food, do not receive it again into the mouth; but this takes place in ſeveral tribes, and is called *rumination*, or chewing the *cud*.

158 Rumination.

Rumination takes place chiefly in thoſe animals that feed on herbage, and have not a muſcular ſtomach; ſuch as all the tribes that Linnæus has ranked under the order *pecora*. In theſe the food, after being ſlightly chewed, is received into the firſt ſtomach, and after remaining there for a ſhort time, it is gradually brought by a retrograde action of the gullet into the mouth, where it undergoes a complete trituration and inſalivation,

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* *Blake on the Structure and Formation of the Teeth.*

Of Digeſtion.

tion, and is then conveyed into the 2d, 3d, and 4th ſtomachs, to be mixed with the gaſtric juice.

Some of thoſe birds which have a dilating ſac or ingluvies, ſeem alſo to ruminate. This in the parrot was obſerved by the gentlemen of the French academy. It has ſince been obſerved in rooks, macaws, cockatoos, and others; and Mr Hunter, to whom phyſiology is ſo much indebted, diſcovered that the male and the female pigeon ſecrete in their ingluvies a certain liquor for feeding their young; and that moſt kinds of what have been called ruminating birds do very often in expreſſing their feelings regurgitate their food. Yet both this and another ſpecies of regurgitation which is very common with thoſe animals that ſwallow indigeſtible ſubſtances with their food, ſhould be carefully diſtinguiſhed from rumination. For a farther account of rumination, and of the digeſtive organs of ruminating animals, ſee *Comparative* ANATOMY, N^o^ 228—234. and *Phil. Tranſ.* 1807, Part ii.

159 Chymification.

The food having entered the ſtomach, undergoes in that organ proceſſes that are partly mechanical, or rather organic, and partly chemical, depending on the ſtructure of the ſtomach, and the nature of the juices ſecreted into its cavity. By theſe actions it is reduced into a pulpy ſubſtance commonly called *chyme*.

160 Organic action of the ſtomach.

The organic action of the ſtomach is greater or leſs, according as this organ is more or leſs muſcular. There are many animals, chiefly birds of the granivorous tribes, that have a very muſcular ſtomach, commonly called *gizzard*, capable of grinding, not only the grains received into it, but even of reducing to powder ſmall pieces of glaſs, and of blunting the points of needles and lancets. Theſe facts were firſt proved by Borelli, who introduced into the gizzards of fowls, nuts, filberts, hollow ſpheres of glaſs, hollow cubes of lead, ſmall pyramids of wood, and ſeveral other ſubſtances, which he found were either cruſhed together, or broken to pieces. He computes the power exerted by the ſtomach of the Indian cock as equal to the preſſure of 1350 pounds weight. Theſe experiments were repeated and verified by Spallanzani.

Some animals that are not poſſeſſed of a muſcular ſtomach have, within that organ, teeth, or other hard bodies, for the purpoſe of breaking or grinding their food. This is the caſe with many of the cruſtacea, as crabs and lobſters.

A great many animals have what Spallanzani calls *intermediate* ſtomachs, i. e. not ſo muſcular as the gizzard of fowls, nor ſo membranous as the ſtomachs of ruminating animals; this is the caſe with many birds, as ravens, crows, herons, &c. The ſtomachs of theſe animals are poſſeſſed of conſiderable force, though this is not nearly equal to that exerted by the gizzard. Theſe animals poſſeſs the power of rejecting by the mouth the ſubſtances that are incapable of digeſtion in the ſtomach, every nine, or ſometimes every three hours.

The animals with membranous ſtomachs are very numerous, comprehending man, moſt beaſts and birds of prey; many reptiles, ſnakes, fiſh, &c. The ſtomachs of theſe animals are ſuſceptible of but little muſcular action, though in many ſpecies they both contract upon the food, and reject it through the gullet, on various occaſions. Birds of prey, like the ravens, crows, &c. poſſeſs the power of rejecting, in the form of pellets, the indigeſtible parts of their food, which uſually takes place every 24 hours.

161 [illegible]

A moſt intereſting paper by Mr Everard Home is publiſhed in the Philoſophical Tranſactions for 1807, on the ſtructure and functions of the ſtomachs of various animals. We regret that our limits permit us to give little more than the reſults of his inquiry.

From particulars [illegible] reſpecting the ſtomachs of ruminating animals, Mr Home was led to believe that the fourth ſtomach in theſe tribes was either always, or during digeſtion, divided into two portions, each performing a different office in the digeſtive proceſs; and he even conjectured, that a ſimilar diviſion might take place in other animals.

Mr Home has examined the ſtomachs of a great variety of animals, and inveſtigated the progreſs of digeſtion in *ruminants*, the *hare* tribe, which occaſionally ruminate, the *beaver*, *dormouſe*, *water-rat*, *common rat*, *mouſe*, *horſe*, and *aſs*, *kangaroo*, *peccari*, *hippopotamus*, *elephant*, the [illegible], *fowls*, and laſtly, in *man*.

162 Human ſtomach the link between carnivorous and phytivorous ſtomachs.

The human ſtomach appears to be the uniting link between thoſe that are fitted only to digeſt vegetable ſubſtances, and thoſe of animals that are entirely carnivorous; and yet we find, that in its internal ſtructure it is in every material reſpect ſimilar both to thoſe of the monkey and ſquirrel, which uſually digeſt only vegetable food, and to thoſe of carnivorous animals.

163 Into a *cardiac* and *pyloric* portion.

The human ſtomach is occaſionally divided into a *cardiac* and a *pyloric* portion, by a muſcular contraction ſimilar to thoſe of other animals; and as this circumſtance has not before been noticed, it is proper to be more particular in deſcribing it.

The firſt inſtance in which Mr Home obſerved this muſcular contraction in the human ſtomach, was in a woman who died in conſequence of being burnt, and who had been unable to take much nouriſhment for ſeveral days before her death. The ſtomach was found empty, and was taken out of the body at a very early period after death. It was carefully inverted to expoſe its internal ſurface, and gently diſtended with air. The contraction was ſo permanent, that after the ſtomach had been kept in water, in an inverted ſtate, for ſeveral days, and at different times diſtended with air, the appearance was not altogether deſtroyed.

Since that time, Mr Home has taken every opportunity of examining the human ſtomach ſhortly after death; and he finds that this contraction, in a greater or leſs degree, is very generally met with. He is of opinion that this effect is not produced by a peculiar band of muſcular fibres, but that it ariſes from the muſcular coat, in the middle part of the ſtomach, being thrown into action to a greater or leſs extent according to circumſtances. When this part of the ſtomach is examined by diſſection, its muſcular fibres are not to be diſtinguiſhed from the reſt. If the body be examined ſo late as 24 hours after death, this appearance is rarely met with; a circumſtance which accounts for its not having before been particularly noticed.

164 [illegible]

That the food is diſſolved in the *cardiac* portion of the human ſtomach, is proved by this part only being found digeſted after death; the inſtances of which are ſufficiently numerous to require no addition being made to them. This could not take place unleſs the ſolvent liquor was depoſited there. Mr Hunter goes ſo far as to ſay in his paper on this ſubject, "there are few dead bodies in which the ſtomach at its great end is not in ſome degree digeſted."

165 but the chyle formed in the pyloric portion. That the chyle is not formed there, and that it is commonly formed before the food paſſes through the *pylorus*, is proved by the reſult of ſome experiments made by Mr Hunter upon dogs, in the year 1760. The dogs were killed while digeſtion was going on; and in all, the food was leaſt diſſolved, or even mixed, towards the great end of the ſtomach, but became more and more ſo towards the *pylorus*, juſt within which it was mixed with a whitiſh fluid like cream.

166 Solvent liquor ſecreted by glands near the gullet. From the reſult of theſe experiments, as well as from the analogy of other animals, it is reaſonable to believe, that the glands ſituated at the termination of the cuticular lining of the œſophagus, which are deſcribed by Mr Home, ſecrete the ſolvent liquor, which is occaſionally poured on the food, ſo as to be intimately mixed with it before it is removed from the cardiac portion; and the muſcular contraction retains it there, till this takes place.

167 Curvature of the ſtomach accounted for. Such contraction being occaſionally required in the ſtomach, accounts for its being more or leſs bent upon itſelf, as by this ſtructure it is more readily divided into two portions, by the action of the muſcular fibres at that part where the angle is formed.

This contraction alſo explains why the contents of the ſtomach are not completely diſcharged from the firſt effect of an emetic; and by it Mr Home thinks we may explain the cramp of the ſtomach, and ſome kinds of indigeſtion.

168 Ornithorinchus the real link between quadrupeds and birds. After comparing the ſtomachs of ſeveral carnivorous animals with that of man; in tracing the gradation from carnivorous beaſts through the bat tribe to birds of prey, Mr Home remarks that "the only real link between the ſtomachs of quadrupeds and birds is that of the ornithorinchus (or platypus), which, however, is more an approach to the gizzard, being lined with a cuticle containing ſand, and having the ſame relative ſituation to the œſophagus and duodenum. The food of this animal is not known; it is probably of both kinds; the papillæ at the pylorus, which appear to be the ſecretory ducts of glands, are peculiar to it.

169 General concluſions. From the facts and obſervations brought forward in this valuable paper, Mr Home deduces the following general concluſions. "That the ſolvent liquor is ſecreted from glands of a ſomewhat ſimilar ſtructure in all animals, but much larger and more conſpicuous in ſome than in others.

"That theſe glands are always ſituated near the orifice of the cavity, the contents of which are expoſed to their ſecretion.

"That the viſcid ſubſtance found on the internal membrane of all the ſtomachs that were examined recently after death, is reduced to this ſtate by a ſecretion from the whole ſurface of the ſtomach, which coagulates albumen. This appears to be proved, by every part of the fourth cavity of the calf's ſtomach having the property of coagulating milk.

"This property in the general ſecretion of the ſtomach leads to an opinion, that the coagulation of fluid ſubſtances is neceſſary for their being acted on by the ſolvent liquor; and a practical obſervation of the late Mr Hunter, that weak ſtomachs can digeſt only ſolid food, is in confirmation of it.

"That in converting animal and vegetable ſubſtances into chyle, the food is firſt intimately mixed with the general ſecretions of the ſtomach, and after it has been acted on by them, the ſolvent liquor is poured upon it, by which the nutritious part is diſſolved. This ſolution is afterwards conveyed into the pyloric portion, where it is mixed with the ſecretions peculiar to that cavity, and converted into chyle.

"The great ſtrength of the muſcles of the pyloric portion of ſome ſtomachs will, by their action, compreſs the contents, and ſeparate the chyle from the indigeſtible part of the food.

"In animals whoſe food is eaſy of digeſtion, the ſtomach conſiſts of a cardiac and pyloric portion only; but in thoſe whoſe food is difficult of digeſtion, other parts are ſuperadded, in which it undergoes a preparation before it is ſubmitted to that proceſs."

170 Action of the gaſtric juice. The action of the juices of the ſtomach, or of what we call the *gaſtric juice*, appears to have much more effect in the proceſs of chymification, than the muſcular action of the ſtomach, though the diſſolving power of this fluid ſeems to be proportionally leſs in thoſe animals that have the moſt muſcular ſtomachs. The gaſtric juice of granivorous birds is capable of diſſolving fleſh; but when this is entire, it requires four or five days for ſolution; whereas when bruiſed, half that time is ſufficient. Even grain is not diſſolved in it except when bruiſed. The gaſtric juice of animals with intermediate ſtomachs diſſolves fleſh and cartilage, but not bone. It is incapable of diſſolving entire ſeeds. In animals with membranous ſtomachs, the gaſtric juice is extremely active, and ſeems to be almoſt the only agent in the digeſtive proceſs. In ſome of theſe animals, however, as the ruminating tribes, this fluid has no effect on the food, unleſs it be bruiſed, or thoroughly maſticated. Spallanzani found, that owls digeſt fleſh and bones, but not grain;—that the gaſtric juice of the eagle diſſolves bread and bone, and even animal and vegetable matters, when it is taken out of the body;—that a wood pigeon may be gradually brought to live on fleſh;—that the owl and falcon do not digeſt bread;—that the gaſtric juice of the dog diſſolves even the enamel of the teeth.

Hence, in every order of animals, the gaſtric juice is the principal cauſe of digeſtion, and it agrees in all in many properties, and differs in others. In the frog, the newt, ſcaly fiſhes, and other cold-blooded animals, it produces digeſtion in a temperature nearly equal to that of the atmoſphere. In warm-blooded animals it is capable of diſſolving the aliment in a degree of heat lower than that of theſe animals. In them too the food is digeſted in a few hours, whereas in the oppoſite kind it requires ſeveral days, and even weeks, particularly in ſerpents; likewiſe, the gaſtric juice of the gallinaceous claſs can diſſolve only bodies of a ſoft and yielding texture, and previouſly triturated; whilſt in others, as ſerpents, the heron, birds of prey, and the dog, it decompoſes ſubſtances of great tenacity, as ligaments and tendons; and even of conſiderable hardneſs, as the moſt compact bone. Man belongs to this claſs, but his gaſtric juice ſeems to have no action on the hardeſt kinds of bones. Some ſpecies, likewiſe, are incapable of digeſting vegetables, as birds of prey; but man, the dog, cat, crows, &c. diſſolve the individuals of both kingdoms alike, and are omnivorous, and in general their gaſtric juices produce theſe effects out of the body.

For an account of the chemical nature and properties of the gaſtric juice, ſee CHEMISTRY, N° 2551.

171 Solubility of foods. The proceſs of chymification depends alſo, in a great meaſure, on the nature of the ſubſtances employed as food, as ſome of theſe are much more ſoluble than others. On this ſubject much information may be derived by conſulting the experiments of Dr Stark *, and thoſe of M. Goſſe of Geneva, an abſtract of which is given in Johnſon's Animal Chemiſtry, vol. i. p. 207. From the latter experiments it appears, *1ſt*, That the following ſubſtances are either inſoluble, or are not digeſted in the uſual time in the ſtomach.

Animal ſubſtances. 1. Tendinous parts. 2. Bones. 3. Oily or fatty parts. 4. Indurated white of egg.

Vegetable ſubſtances. 1. Oily or emulſive ſeeds. 2. Expreſſed oils of different nuts and kernels. 3. Dried grapes. 4. Rind of farinaceous ſubſtances. 5. Pods of beans and peaſe. 6. Skins of ſtone fruits. 7. Huſks of fruits, with grains or ſeeds. 8. Capſules of fruit, with grains. 9. Ligneous ſtones of fruits. 10. The gaſtric juice does not deſtroy the life of ſome ſeeds; hence bitter-ſweet, hemp, miſletoe, and other plants which ſometimes grow upon trees, are produced by the means of the excrements of birds, the kernels of ſeeds being defended from the menſtruum by their exterior covering.

2d, That the following are partly ſoluble, viz.

Animal ſubſtances. 1. Pork dreſſed various ways. 2. Black puddings. 3. Fritters of eggs, fried eggs and bacon.

Vegetable Subſtances.—1. Salads of different kinds, rendered more ſo when dreſſed. 2. White of cabbage leſs ſoluble than red. 3. Beet, cardoons, onions, and leeks. 4. Root of ſcurvy-graſs, red and yellow carrots, ſuccory, are more inſoluble in the form of ſalad than any other way. 5. Pulp of fruit with acids, when not fluid. 6. Warm bread and ſweet paſtry, from their producing acidity. 7. Freſh and dry figs. By frying all theſe ſubſtances in butter or oil they become ſtill leſs ſoluble. If they are not diſſolved in the ſtomach, they are, however, in the courſe of their paſſage through the inteſtines.

3d, That the following are ſoluble, or eaſy of digeſtion, being generally reduced to chyme in an hour, or an hour and a half.

Animal Subſtances.—1. Veal, lamb, and in general the fleſh of young animals, are ſooner diſſolved than that of old. 2. Freſh eggs. 3. Cows milk. 4. Perch boiled with a little ſalt and parſley. When fried or ſeaſoned with oil, wine, and white ſauce, it is not ſo ſoluble.

Vegetable Subſtances.—1. Herbs, as ſpinach, mixed with ſorrel, are leſs ſoluble. Celery. Tops of aſparagus, hops, and the ornithogalus of the Pyrenees. 2. Bottom of artichokes. 3. Boiled pulp of fruits, ſeaſoned with ſugar. 4. Pulp or meal of farinaceous ſeeds. 5. Different ſorts of wheaten bread, without butter, the ſecond day after baking; the cruſt more ſo than the crumb. Salted bread of Geneva more ſo than that of Paris without ſalt; brown bread in proportion as it contains more bran is leſs ſoluble. 6. Rapes, turnips, potatoes, parſnips, not too old. 7. Gum arabic, but its acid is ſoon felt. The Arabians uſe it as food.

The ſolvent power of the gaſtric juice is increaſed by various ſtimulants, eſpecially by thoſe called *condiments*, as ſea ſalt, ſpices, muſtard, vinegar, as well as by vinous and ſpirituous liquors and old cheeſe in ſmall quantities, and by various bitters. It is retarded by large quantities of diluting liquors, eſpecially when taken hot; by acids and aſtringents taken a ſhort time after eating; by unctuous ſubſtances; by mental employment, or ſevere bodily exerciſe, too ſoon after a meal; and by leaning with the breaſt againſt a table.

172 Various theories of digeſtion. It may be proper here to notice the various opinions that have been entertained reſpecting the immediate cauſe of digeſtion. The principal of theſe opinions are, that it is produced by coction or heat; by trituration in the ſtomach; by fermentation, or by putrefaction.

173 Heat. That it is not brought about by heat alone, will appear from the circumſtance, that many cold-blooded animals digeſt their food as completely, though not ſo expeditiouſly, as warm-blooded animals.

174 Trituration. That it is not effected by trituration in the ſtomach alone, is evident from the experiments that have been made by Spallanzani, Stevens, and others, of giving to animals food encloſed in hollow perforated balls, ſufficiently ſtrong to reſiſt the muſcular power of the ſtomach; as the balls have been found empty, and not compreſſed.

175 Fermentation. That it is not owing to fermentation is proved by the circumſtance, that the more perfectly digeſtion proceeds, the leſs is the evolution of gaſes in the ſtomach; the contrary of which would be the caſe, if digeſtion conſiſted in a fermentation of the aliment.

176 Putridity. That it does not depend on putridity, is evidenced by the obſervations that have been made on putrid food given to dogs, and examined ſome time after, when it was found perfectly ſweet.

On the whole it appears, that in moſt animals the digeſtion of food in the ſtomach depends partly on a due degree of heat, partly on the vital action of the ſtomach, but chiefly on the action of the gaſtric juice.

177 Chymification. When the aliments have been converted in the ſtomach to the crude pulp called *chyme*, they are gradually propelled through the *pylorus* into the duodenum, where they are mixed with the bile, the pancreatic juice, and the fluids that are ſeparated by the mucous coat of that inteſtine, and are thus reduced to a ſtill finer pulp, containing, as one of its principal ingredients, the nutritious fluid called *chyle*, the nature and properties of which, as they have been but ſlightly mentioned in the former parts of this work, fall to be noticed here.

178 Properties of chyle. The properties of chyle have not been minutely inveſtigated; but according to Fordyce, as far as experiment has been carried, the chyle of quadrupeds is ſo ſimilar to that of man, and of each other, as hardly to be diſtinguiſhed, even in tribes the moſt oppoſite to each other in their ſtructure, food, and habits of life. As far as we can perceive, the chyle of a dog or a wolf differs in nothing from that of a ſheep or an ox.

The chyle conſiſts of three parts; one part which is fluid, and contained in the lacteals, but coagulates on extravaſation.

The ſecond part conſiſts of a fluid, which is coagulable by heat, and in all its properties hitherto obſerved, it is ſimilar to the ſerum of the blood.

The third part conſiſts of globules, which render the whole white and opake. Theſe globules have been ſuppoſed by many to be an expreſſed oil; but this has not been proved. Neither has it been perfectly demonſtrated that ſugar is contained in the chyle, although it has been

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* Stark's Works.

been made very probable. The difficulty of determining theſe points ariſes from the ſmall quantity that can be collected, the largeſt animals not ſupplying more than one ounce or two, at the moſt. However, the part coagulating on extravaſation; the part agreeing with ſerum in its qualities; the globular part, which in ſome animals, but not in quadrupeds, exiſts without giving whiteneſs to the chyle—alone, or along with ſugar, form the eſſential parts of the chyle *.

179 Progreſs of the chyle.

The compound pulpy matter containing the chyle is carried forward from the duodenum through the whole courſe of the inteſtines, where it is ſubjected to the continual action of the internal wrinkled membrane of the bowels, and its nutritious particles, or chyle, ſelected and abſorbed by the lacteals that are abundantly diſtributed there, and open their mouths directly within the cavity.

180 Paſſage of food through the inteſtines.

As to the movements of the alimentary canal, the direction of hairs found in the ſtomach, and the balls of hairs which are thrown up, would appear to indicate a circular motion. The inteſtinal part has a motion ſimilar to that of a worm, and is called the *vermicular* or *periſtaltic.* Here every portion retains its own motion, although it be ſeparated from the reſt by ligatures. The ſtomach of the polype, the gullets of the ruminating kinds, and the cæca, have the motion in different directions at different times; and that obſerved in the alimentary canal of a louſe is, when viewed through a microſcope in the time of action, amazingly rapid; the ſtimulating cauſes employed are the food, the different liquors with which it is mixed, the air, the nerves where they exiſt, and a portion of heat. Some degree of heat is neceſſary to every proceſs of digeſtion, both in the animal and vegetable kingdom; what that degree is depends on the nature of the living body; and is various according to its age, its health, its employments, and habits.

With reſpect to the function of digeſtion in the lower claſſes of animals, we can ſay but little. We know that their food is diſſolved in the ſtomachs of the cruſtacea, of molluſca, and of polypes; but whether this proceſs in moſt inſects and worms is any thing more than imbibition, or taking in aliment, which is to undergo little change, we are uncertain. We know, indeed, that many inſects live on ſubſtances which muſt be diſſolved before they enter into the pores of their bodies, and that many of them abound in acrid juices, which are well fitted for this ſolution. It does not appear that plants poſſeſs what may be called the faculty of digeſtion.

181 Relations between digeſtion and ſenſation.

The relations between digeſtion and the functions we have already conſidered, eſpecially ſenſation, are various and important. The ſympathies that exiſt between the head and the ſtomach, have been long acknowledged. Several affections of the brain are accompanied with ſickneſs at the ſtomach, loſs of appetite, and indigeſtion; while, on the other hand, the deranged ſtate of the digeſtive organs ſeldom fails to produce giddineſs, headach, ringing in the ears, confuſion or depravation of ſight, &c.; and if the former ſymptoms ariſe to a great height, as in the caſe of overloaded ſtomach or ſurfeit, coma, or even apoplexy, is frequently produced. In many nervous affections, particularly hyſteria and hypochondriaſis, in which there frequently takes place diſtreſſing accumulations of air in the ſtomach and bowels, the affections of the head, ſuch as ſtupor, confuſion of thought, partial blindneſs, &c. ſometimes proceed to ſuch a height, as to threaten, or even ſometimes to produce, an apoplectic paroxyſm. In many caſes theſe affections are referred immediately to the head; but are proved, in moſt inſtances, to depend on the diſordered ſtate of the alimentary canal, from the immediate relief procured by thoſe remedies which promote the diſcharge of air, or produce copious evacuation from the bowels. On the other hand, in ſome diſeaſes, where the head is primarily affected, as in phrenitis hydrocephalica (water in the head), the complaint is referred to the bowels, from the coſtiveneſs or other diſordered ſtate of theſe. The daily experience of literary men ſhows how much intenſe thought diminiſhes the digeſtive powers, and how imperfectly ſtudious occupations can be carried on after a full meal. The action of the digeſtive organs is alſo conſiderably influenced by the mind, or the paſſions. We know how readily the appetite may be diminiſhed or deſtroyed by ſudden anger or affliction.

The action of the ſtomach may even be influenced by the will. We have known a perſon who could vomit whenever he pleaſed; and Dr Darwin ſpeaks of another who had acquired this voluntary command over the inverted motions of the ſtomach and throat, to ſuch a degree, as to gain a ſubſiſtence by exhibiting theſe unnatural powers to the public. At theſe exhibitions he was accuſtomed to ſwallow a pint of red rough gooſeberries, and a pint of white ſmooth ones; to bring them up in ſmall parcels into his mouth, and reſtore them ſeparately to the ſpectators, who called for red or white, as they pleaſed, till the whole were redelivered *.

The ſympathies that take place between the brain and the digeſtive organs, are eaſily explained, from conſidering the diſtribution of the great ſympathetic nerve, to illuſtrate which we have given a figure (fig. 1.) ſhowing its courſe and diſtribution from the head through the cheſt, as far as the ſtomach.

Plate CCCCXVIII.

182 Relations between digeſtion and motion.

The relations between the digeſtive and the locomotive functions, are not leſs obvious. Experience ſhews how much digeſtion depends on regular exerciſe, and how imperfectly it is carried on in the ſtomach of the indolent and ſedentary; while, on the other hand, when the ſtomach is overloaded, voluntary motion becomes difficult and fatiguing. Spaſmodic contractions of the muſcles, twitchings of the limbs, and ſimilar affections, are the common attendants of indigeſtion, though theſe may perhaps be referred equally to the nervous as to the muſcular ſyſtem.

183 Morbid affections of digeſtion.

The principal morbid affections of digeſtion are, nauſea, flatulence, eructation, rumination (G), vomiting, heartburn,

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* Fordyce on Digeſtion.

* Zoonomia, vol. i. p. 276.

(G) That ruminating power which is natural to the quadrupeds of the order *Pecora*, is ſometimes met with in man. We have heard of perſons who regularly brought up their food into the mouth ſoon after eating, chewed it over again, ſwallowed the juices with the ſaliva, and ſpat out the more ſolid parts. In theſe caſes, the rumination is

Of Absorption.

heartburn, water brash or *pyrosis*, loss of appetite, and inordinate appetite; for an account of which, see the article Medicine.

Chap. VI. *Of Abſorption.*

184 Abſorption.

We have ſaid that the chyle is taken up from the compound pulpy matter compoſed of the food and the animal juices, as it paſſes through the inteſtines, by the lacteals. This, however, is not the only abſorption that takes place in the animal body. The fluids poured out into cavities by the exhalant arteries, as well as all the ſecreted or exuding fluids, and even the ſolid materials of the ſyſtem, are taken up by the lymphatics, and carried into the circulation; the blood poured out into cells in ſome parts, is evidently abſorbed by veins; and, as we ſhall endeavour to prove, an abſorption takes place over the external ſurface of the body.

185 Organs.

What is called the abſorbent ſyſtem, is compoſed, in the ſuperior animals, of the *lacteals*, the *meſenteric glands*, the *thoracic duct*, the *lymphatics*, and the *lymphatic glands*. For an account of theſe in man, ſee Anatomy, Part I. Sect. 14. This ſyſtem, in a greater or leſs degree, is found in all animals, except ſome molluſca, inſects, worms, and zoophytes. See Cuvier's *Leçons*, tom. iv. leç. xxiii. and Blumenbach's *Comparative Anatomy*, chap. xiii.

186 By lacteals and lymphatics.

The action of the lacteals and lymphatics is probably much the ſame, and is exerted in a ſimilar manner. That of the lacteals is to convey the nouriſhing parts of the food into the circulating ſyſtem; that of the lymphatics to carry to the ſame ſyſtem watery fluids, for the purpoſe of diluting the blood, and ſuch fluid or ſolid materials as are uſeleſs, or may prove noxious to the ſyſtem. The action of the lacteals may be readily ſeen on opening an animal killed two or three hours after eating; and in this way they were firſt ſeen by Aſellius. They are then found filled with a milky fluid, while, at other times, they are inviſible. That the lymphatics are the principal organs of abſorption, is now the general opinion of all phyſiologiſts, though their action in this way can ſeldom be demonſtrated. As, however, it has been ſatisfactorily proved, that the veins do not in general abſorb, and as the lymphatics that proceed from parts that contain irritating matters, are often ſeen inflamed, proving that they have imbibed a part of the irritating matter, there is little doubt that the office of abſorption belongs almoſt excluſively to the action of the lymphatics.

Mr John Hunter made ſeveral experiments to ſhow, that the veins do not abſorb. He conveyed milk, coloured with various dyeing ſubſtances, or perfumed with muſk, into the ſmall inteſtines of an animal, which was immediately after killed. On opening the veins of the inteſtines, and allowing the blood to ſeparate into ſerum and craſſamentum, the ſerum was found neither to be tinged with the colouring matters, nor ſcented by the perfume, while the coloured milk was evident in the lacteals. That the veins, however, do in ſome caſes perform the office of abſorbents, is evident from the ſpeedy depletion of the *corpora cavernoſa penis*, after having been diſtended with arterious blood; and from a ſimilar depletion that takes place in the nipple of the female breaſt.

187 By the veins.

188 By the ſkin.

The principal object in diſpute reſpecting the function of abſorption in man and the higher claſſes of animals, is, whether the ſkin poſſeſſes the power of abſorption. This queſtion, as it is both curious and important, we ſhall examine pretty much at large; and for this purpoſe we ſhall avail ourſelves of an able paper on the ſubject, by Dr George Kellie.

It had long been received as an eſtabliſhed truth, that the ſkin was an inhaling or an abſorbing organ, and that ſometimes the inhalation balanced, or even ſurpaſſed, the exhalation of the cutaneous ſurface; but of late this doctrine of inhalation has been called in queſtion, and, in the opinion of many, entirely overthrown. It has been ſaid, that this abſorption neither does nor can take place on the outſide of the cuticle; that in every caſe of apparent abſorption, the *epidermis* had been injured, or that the matter abſorbed had been mechanically forced through it, and brought into immediate contact with the ſkin.

Haller had aſſerted*, on the authority of Dufault, that the body acquired an increaſe of weight in the warm bath; and this augmentation of weight was eſteemed an *experimentum crucis* in favour of cutaneous abſorption.

Experiments, however, have ſince been made with every neceſſary care, which ſeem to contradict the poſition, and to prove, that the body acquires no additional weight in the warm bath.

Seguin, from a great many experiments of this deſcription, concludes, that there is no inhalation, becauſe the body, ſo far from gaining, always loſt ſome part of its weight during immerſion, although much leſs than in the air in equal times†.

In other experiments again, as in thoſe of Gerard and Currie, there was no increaſe of weight; but the body was

* [illegible] *Phyſiolo-* [illegible]

† *La Med. Eclairée.*

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is to be conſidered as a diſeaſe, depending on the inability of the ſtomach to propel the ſolid food into the duodenum.

Mr Home, in the paper we have already quoted, (N° 161—169), relates a curious inſtance of habitual rumination in a man 19 years of age, who is blind, and has been an idiot from his birth. He has a very voracious appetite, and it is neceſſary to reſtrict him in the quantity of his food, ſince, if he eats too much, it diſorders his bowels. Fluid food does not remain on his ſtomach, but comes up again. He ſwallows his dinner, which conſiſts of a pound and a half of meat and vegetables in two minutes, and in about 15 minutes he begins to chew the cud. Mr Home was once preſent on this occaſion. The morſel is brought up from the ſtomach with apparently a very ſlight effort, and the muſcles of the throat are ſeen in action when it comes into the mouth: he chews it three or four times, and ſwallows it; there is then a pauſe, and another morſel is brought up. This proceſs is continued for about half an hour, and he appears to be more quiet at that time than at any other. Whether the regurgitation of the food is voluntary or involuntary, cannot be aſcertained, the man being too deficient in underſtanding, to give any information on the ſubject.

was not obſerved to have loſt any thing during immerſion in the warm bath.

Now, during theſe experiments, the body was doubtleſs waſting, by the pulmonary and cutaneous diſcharges, and yet the weight of the body either continued unchanged; or where a loſs of weight was obſerved, this was conſtantly leſs, greatly leſs, than is experienced during the ſame interval in air. And we might be inclined to infer, from a truth ſo general, and ſo well aſcertained, an argument in favour of abſorption.

It might be argued, that the loſs of weight amounts to little or nothing, becauſe, during immerſion, the body acquires more by inhalation than it does or can do in the air; that the loſs by the pulmonary and cutaneous diſcharges is counterbalanced, or nearly counterbalanced, by the increaſed abſorption.

Thoſe, however, who deny abſorption, will not allow us the advantage of this argument. They tell us, that the exhalation by the ſkin and lungs is diminiſhed, which ſufficiently explains why the body loſes leſs in the warm bath than in air. But that the accuſtomed diſcharges are ſuppreſſed or diminiſhed in the warm or tepid bath, is, we apprehend, far from being proved; and, till this propoſition is made good, the argument againſt cutaneous inhalation cannot be ſecurely maintained.

One of Dr Currie's caſes deſerves farther conſideration. We allude to the caſe of dyſphagia, publiſhed by this gentleman ‡, in which Mr M. the ſubject of the caſe, was ſeveral times immerſed in a warm bath of milk and water, and was weighed when taken out. Mr M. it is true, gained no weight while in the warm bath; but the loſs continually going on in the air was, as in other trials, ſuſpended during the immerſions. Beſides, he always expreſſed great comfort from the bath, with abatement of thirſt; and, ſubſequent to the daily uſe of it, the urine flowed more plentifully, and became leſs pungent. An obſervation, preciſely ſimilar, is made by Mr Cruickſhank. "A patient of mine (ſays Mr Cruickſhank), with a ſtricture of the œſophagus, received nothing, either ſolid or liquid, into the ſtomach for two months; he was exceedingly thirſty, and complained of making no water. I ordered him the warm bath for an hour, evening and morning, for a month; his thirſt vaniſhed, and he made water in the ſame manner as when he uſed to drink by the mouth (H) *.

But to return to the caſe of Mr M——. Dr Currie himſelf remarks, that the diſcharge by urine alone exceeded much in weight the waſte of his whole body; and it cannot be doubted that the diſcharge by ſtool and perſpiration exceeded the weight of the clyſters.—Thus it appears, that the *egeſta* exceeded the *ingeſta* in a proportion much greater than the waſte of his body will explain. How is this accounted for, Dr Currie aſks, unleſs by cutaneous abſorption?

That the exceſs of theſe diſcharges above the *ingeſta* and total waſte, can be accounted for by abſorption only, was indeed an irreſiſtible concluſion. Still, however, cutaneous abſorption is denied; and, when forced to confeſs, that there are caſes where the *egeſta* exceed the *ingeſta* in a much greater proportion than the waſte of the body will explain, and which can only be accounted for by abſorption, they refuſe this function to the ſkin, and beſtow it moſt liberally, and, in ſo far as we know, moſt gratuitouſly, on the lungs. We are not entitled, in return, to deny the reality of pulmonary abſorption, but we may ſurely be allowed to urge, that there is no proof that the only inhaling organ is in the lungs; and there is none againſt the poſſibility of cutaneous abſorption.

Is it not, on the other hand, proved, by the experiments of Seguin and Lavoiſier, that the exhalation greatly exceeds the abſorption by the pulmonary ſyſtem? And if this is always the caſe, we cannot explain by pulmonary inhalation alone, why the *egeſta* ſhould, in ſome caſes, exceed the *ingeſta* in a much greater proportion than the waſte of the body will account for.

We now proceed to examine another claſs of experiments, much inſiſted on by thoſe who deny cutaneous abſorption; we mean thoſe experiments performed by immerſing a part of the body in ſolutions of active drugs, the abſorption of which ſhould be indicated by their uſual effects on the ſyſtem.

Seguin made numerous experiments of this kind, with ſolutions of muriate of mercury (corroſive ſublimate), on ſyphilitic patients. And we are informed, that in caſes where the epidermis was perfectly ſound, neither the known effects of mercury on the body, nor any amelioration of the venereal ſymptoms, was ever obſerved.

He alſo immerſed his own arm in a ſolution of two drams of the mercurial muriate in ten pounds of water. At the temperature of 10° and 28° Reaumur, no part of the ſalt was miſſing at the end of the experiment; but when the bath was at 18° of the ſame ſcale, there was a loſs of one or two grains of the muriate in the hour, though the quantity of fluid was not diminiſhed.

The explanation given by Seguin of this unexpected reſult is curiouſly ingenious, but embarraſſed, and inconſiſtent.

At the temperature of 12°, he obſerves, the exhalants are in a ſtate of contraction, and their orifices nearly cloſed. When the heat again is raiſed to 26°, the exhalation is ſo rapid, that nothing can enter the veſſels from without; but at 18° of temperature, the orifices of the exhalants are ſufficiently relaxed, and the exhalation at the ſame time ſo conveniently languid, that the ſolution reſts quietly in contact with the matter of perſpiration in the mouths of the exhalants, where it is ſomehow or other decompoſed; a part of the ſalt leaving the water of ſolution, and combining with the perſpirative matter, with which it is carried into the ſyſtem *. Carried into the circulation by the exhalants! Is not this a plain acknowledgment of the reality of inhalation? But if in one caſe ſubſtances may thus be carried into the circulation, why not in many others?

Surely if the weight continues undiminiſhed, in circumſtances

‡ *Medical Report*, firſt edit. p. 227.

* *Cruikſhank on the Abſorbents.*

* *La Med. Eclairée*, tom. iii. p. 238.

(H) That thirſt may be allayed by immerſion in water, is fully proved by the experience of ſhipwrecked mariners, who, when obliged to take to their boats with very little freſh water, frequently have recourſe to bathing in the ſea, or covering themſelves with a ſhirt wetted in ſalt water, and thus quench their thirſt, nearly as well as if they had drunk freſh water.

cumſtances where the body is continually loſing, we may infer, that ſomething has been gained by abſorption. And where the egeſta exceed the ingeſta in a proportion much greater than the waſte of the body will explain, there abſortion muſt have been going on.

The caſe of Mr M——, publiſhed by Dr Currie, is not ſingular. The writings of phyſicians abound in ſimilar examples. They had often occurred to that excellent clinical practitioner De Haen, who was therefore perſuaded that water was imbibed [†]. Haller too, with his uſual induſtry, has collected a great many obſervations of the ſame kind [‡].

Again, when phyſicians were engaged in their extenſive ſtatical experiments, weighing themſelves, their *ingeſta* and *egeſta*, for many months, nay for years together; they ſometimes obſerved, that ſo far from loſing, they had gained weight, eſpecially during cold and moiſt weather. Thus, Rye, under a cold and humid atmoſphere, gained 13 ounces. Linnings, during two hours expoſure to cold, acquired 8¼ ounces. The abbé Fontana, after two hours expoſure to a moiſt atmoſphere, returned home ſome ounces heavier than he went out. De Gorter gained 6 ounces in one night; and on other occaſions, two ounces and four ounces. Theſe obſervations are confirmed alſo by the experience of Dr Francis Home, profeſſor of Materia Medica in the univerſity of Edinburgh. 'Having fatigued myſelf pretty much (ſays he) in the afternoon, I went to bed without ſupper, and was ſo hungry that I could not fall aſleep for ſome time. Betwixt eleven at night and ſeven next morning I had gained two ounces [‡].'

Here then are examples of the body gaining conſiderably more than the *ingeſta* will account for, acquiring weight when neither food nor drink had been ſwallowed. And we have the concurring teſtimony of the moſt reſpectable writers ſupporting the ſame truth.

How can this increaſe of weight be accounted for, unleſs by abſorption? In ſuch experiments, the *loſs of weight*, which cannot be accounted for by the ſenſible *egeſta*, is attributed to the exhalation; the increaſed weight ſometimes obſerved, and which cannot be explained by the ſenſible *ingeſta*, muſt in like manner be referred to the *inhalation*.

That the ſyſtem may be affected by active medicines introduced and abſorbed by the ſkin, cannot be denied. And were proofs ſtill wanting to eſtabliſh the doctrine of cutaneous abſorption, this argument might be inſiſted on. It is true, that friction is commonly employed when we wiſh to introduce medicines by the ſkin, by which, it is ſaid, the ſubſtance is mechanically forced through the cuticle, and brought into contact with the abſorbents of the true ſkin. The ſyſtem, however, may be affected without friction, for example, by wearing a mercurial plaſter, and more certainly by mercurial fumigation, as practiſed by Lalonette and others [*].

It might even be concluded from an examination of the ſtructure of the ſkin, that abſorption muſt take place at its ſurface. We know that the cuticle is porous, and is penetrated by exhaling veſſels; we know that lymphatics commence immediately below it; and we know that when certain ſubſtances are applied to the cuticle, eſpecially when this application is aided by moderate friction, as in the caſe of applying garlic poultices to the feet, and the more familiar inſtance of mercurial inunction, that theſe ſubſtances are taken up by the abſorbents, and conveyed into the circulation.

From a conſideration of all theſe circumſtances, we think it fully proved, that the ſkin is an abſorbing or inhaling organ. For further proofs we may refer our readers to Bichat's *Anat. Gener.* tom. iv. p. 691.

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Suppoſed retrograde action of the lymphatics.

Mr Charles Darwin, ſon of the late Dr Darwin, publiſhed in 1780, a Latin theſis, which is tranſlated in the 29th ſect. of his father's Zoonomia, vol. i. in which he attempts to prove, that the valves of the lymphatics are ſo formed as in particular caſes to admit of the regurgitation of the abſorbed fluids. The arguments on which he founds this opinion (beſide the difficulty of accounting for the phenomena of ſeveral diſeaſes on any other principle), are chiefly the following:

Firſt, The mouths of the lymphatics ſeem to allow water to paſs through them after death, the inverted way, more eaſily than in the natural direction.

Secondly, In ſome diſeaſes, as diabetes and ſcrofula, it is probable the valves themſelves are diſeaſed, and are thence incapable of preventing the return of the fluids they ſhould ſupport.

Thirdly, There are valves in other parts of the body analogous to thoſe of the abſorbent ſyſtem, which are liable, when diſeaſed, to regurgitate their contents.

Fourthly, The capillary veſſels, which muſt be conſidered as analogous to abſorbents, may be ſeen, in animals ſubmitted to the microſcope, to regurgitate their contents into the arteries, during the ſtruggles of the dying animal.

By means of this hypotheſis (for notwithſtanding the arguments adduced in its favour, we can call it no better), Mr Darwin explained the ſpeedy paſſage of watery fluids from the ſtomach to the urinary bladder; the phenomena of diabetes; diarrhœa, dropſy, cold ſweats; tranſlations of matter, chyle, milk, and urine; the operation of external remedies, &c.

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Abſorption in the loweſt claſſes of animals.

In all thoſe claſſes of animals that poſſeſs a complete abſorbent ſyſtem, the phenomena of abſorption ſeem to proceed much in the ſame manner as in man; but in ſome of the inferior animals, eſpecially in molluſca and worms this function ſeems to be performed by the veins [*]. In the *echinodermata*, however, eſpecially in the ſea-urchin (*echinus eſculentus*), lymphatics have been demonſtrated by the ſecond Monro. In inſects and polypes there is no proper abſorption.

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Abſorption of plants.

The abſorbing veſſels of plants are chiefly the fibrils of the roots, which evidently imbibe moiſture, and perhaps gaſeous fluids, from the earth; but there have alſo been demonſtrated veſſels opening beneath the outer bark, which botanical phyſiologiſts conſider as lymphatics. "Lymphatic veſſels (ſays Wildenow), are found in the epidermis of plants, and are of great minuteneſs, anaſtomoſing in various ways through ſmall intermediate branches." They ſurround the apertures of the cuticle, by which the inhalation and exhalation of vegetables are carried on; but they are ſo minute as not to have yet been filled with coloured liquids. Round each opening, which is commonly ſhut by a moveable valve, they form a circle, rarely a rhombus, as in the *zea mays*. In the *lilium calcedonicum*, thoſe veſſels run obliquely, and ſomewhat in an irregular undulating manner, fig. 2. In the common onion (*allium cepa*), they run in a ſtraight, though oblique and regular form, fig. 3. In the pink, (*dianthus*

Plate cccxviii.

[†] *Ratio Medendi*, part iv. chap. 3.

[‡] *Elem. Phyſiol.* tom. v. p. 90.

[‡] *Medical Tracts and Exper.* p. 250.

[*] *Edinb. Med. and Surg. Jour.* vol. i. p. 181.

[*] *Cuvier Leçons*, tom. iv. p. 161.

(*dianthus caryophyllus*), they are very ſtraight, with ſtraight and horizontally tranſverſe branches, fig. 4. In almoſt every plant they have their certain and peculiar direction, which in each remains conſtantly the ſame *.

192
Theory of abſorption.

The theory of abſorption is ſtill but imperfectly underſtood. We ſhall briefly notice the principal hypotheſes that have been brought forward to account for the entrance of ſubſtances into the mouths of the abſorbing veſſels; for this part of the proceſs alone ſeems to be diſputed.

It was long the opinion of phyſiologiſts, that fluids enter the mouths of the abſorbents on the principle of capillary attraction; but as the abſorbing veſſels are not circumſtanced like rigid capillary tubes, immerſed in a fluid; and as, were this hypotheſis juſt, abſorption ſhould go on with regularity, and all fluids ſhould be abſorbed indiſcriminately, neither of which circumſtances is true; this hypotheſis is now generally abandoned.

Mr John Hunter accounted for the entrance of ſubſtances into the mouths of the abſorbents, by attributing to the mouths of theſe veſſels a power of nibbling, ſimilar to that exerted by a caterpillar when feeding on a leaf. This opinion may be called ingenious, but is certainly very wild and fanciful.

Dr Fullarton, in a theſis on abſorption, publiſhed at Glaſgow in 1800, attributes to the abſorbing orifices, a power of ſuction ſimilar to that of the proboſcis of butterflies, and the tentacula of ſome marine animals.

The firſt and third of theſe hypotheſes ſuppoſe the abſorbents incapable of taking up any but fluid ſubſtances; but we well know that even the hardeſt bones are ſomehow abſorbed, and conveyed to the circulation. We muſt therefore add another hypotheſis, which ſuppoſes that there is ſecreted in the animal body, a fluid capable of diſſolving fleſh and bones†. The hypotheſis, however, is without foundation. It is contrary to the ſimplicity of the animal economy, that there ſhould take place, firſt, a ſecretion of ſolid matters to compoſe the ſtructure of the body, and then a ſecond ſecretion to diſſolve them. We muſt therefore conſider this part of phyſiology as a ſubject of future inveſtigation.

When the abſorbed ſubſtances have once paſſed the barrier of the firſt valve, it is not difficult to account for their further progreſs through the lymphatics. A continual ſucceſſion of freſh abſorbed matter muſt drive forward what is already in the veſſels, while the valves muſt in general prevent its reflux. The impelling force from behind is alſo probably aſſiſted by the irritability of the veſſels. It is not ſo eaſy to decide how the abſorbed matters paſs through the glands, if, as is generally believed, they do not in theſe form continuous tubes, there muſt be a freſh abſorption by the mouths of the veſſels that paſs out of the gland, which is as difficult to account for as the firſt reception at the origin of the veſſels.

193
Relations of abſorption with the preceding functions.

The relations that take place between abſorption and the preceding functions, are perhaps the leaſt underſtood of any that occur in the animal economy. We know that the action of the abſorbents is greatly aſſiſted by muſcular motion, and that it is in general moſt defective in indolent and ſedentary perſons. An evident ſympathy is alſo obſerved between the ſtomach and the abſorbents. Nauſea, and eſpecially vomiting, are powerful promoters of abſorption, and ſome remarkable inſtances are related of the ſpeedy abſorption of a large quantity of purulent matter from an abſceſs, in conſequence of violent vomiting.

CHAP. VII. *Of Circulation.*

194
Circulation.

We have traced the nutritious particles of the food from the inteſtines through the *lacteals*, the *meſenteric glands*, and the *thoracic duct*, into the left *ſubclavian vein*, where we find the chyle is mixed with the venous blood, and carried to the right auricle of the heart. We muſt now conſider how the fluids are conveyed to every part of the body, or we muſt examine the function of *circulation*.

195
Organs.

This function takes place in all the vertebral animals, and in molluſca, worms, and cruſtacea; but there appears to be no real circulation in inſects, zoophytes, and plants.

The organs by which circulation is performed differ eſſentially in the ſeveral claſſes of animals. Thoſe of the human ſyſtem have been deſcribed in the firſt part of ANATOMY, ſect. x. and xi. and a brief comparative view of theſe organs in the inferior animals, has been given in the ſecond part of that article, N° 154, 201—204, 300, &c. and in the articles CETOLOGY, ERPETOLOGY, ICHTHYOLOGY, and ORNITHOLOGY. For a fuller account of theſe latter, we may refer to Cuvier's *Leçons*, lec. xxiv and xxv. and to the Comparative Anatomy of Blumenbach, chap. xii.

196
Pulmonic and ſyſtemic parts.

It is well known that, in the red-blooded animals, the blood is not of the ſame ſhade of red in every part of the body; but that what has paſſed through the lungs, and is circulating through the arteries that proceed from the aorta, is of a florid red colour, while that which is ſent to the lungs by the pulmonary artery, as well as that which is returning from the extremities of the arteries through the veins, is of a purple or crimſon colour. As one ſet of organs always contains florid, and another ſet always crimſon blood, it is convenient to diſtinguiſh each ſet by an appropriate name. Dr Barclay has done this, and he calls that ſet of organs which are employed to convey the blood from the arteries, and diſtributed to the lungs, *pulmonic*, compriſing the *pulmonic veins*, viz. the vena cava and its branches, *pulmonic auricle*, *pulmonic ventricle*, and *pulmonic arteries*: while he denominates that ſet of organs which return the blood from the lungs, and diſtribute it to the ſyſtem, *ſyſtemic*, comprehending the ſyſtemic veins (pulmonary veins), ſyſtemic auricle, ſyſtemic ventricle, and ſyſtemic arteries, (the aorta and its ramifications). One great advantage of this nomenclature, is that it prevents the ambiguity of the expreſſions *right* and *left*, *anterior* and *poſterior*, applied to the auricles and ventricles of the heart. We ſhall therefore employ them in the ſubſequent part of this chapter *.

For an account of the nature and properties of the blood, ſee ANATOMY, Part I. ſect. 14. and CHEMISTRY, N°. 2642.

197
Proofs of the circulation of the blood.

It may not be improper, in this chapter, to notice the principal arguments that have been uſed to prove the circulation of the blood. They are as follow:

1. When an artery is tied, the part of the artery that is betwixt the ligament and the heart, ſwells; but that part of it which is betwixt the ligature and the remote branches, becomes more flaccid than before. On the other hand, when a vein is tied, the part between the li-

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* Willdenow's *Princ. of Bot.* ſect. 230.

† *Duncan's Med. Com.* vol. x. p. 354.

* See *Barclay on Muſcular Motions*, p. 231.

The Circulation.

ligature and the remote branches ſwells, while the part between the ligature and the heart becomes flaccid.

2. The valves placed at the mouths of the aorta and pulmonary artery, must prevent the blood from regurgitating into the ventricles, while they permit it to flow forward through the arteries into the capillary branches of the veins. Again, the valves ſituated in the courſe of the veins prevent the blood from flowing back into the arteries, while they permit it to proceed forward through the venous trunks into the heart.

3. By the aſſiſtance of a microſcope, the blood may be ſeen in the pellucid parts of animals, as the feet of frogs, flowing from the arteries into the veins.

4. When an artery of moderate ſize is wounded, and not ſecured by ligature or compreſſion in proper time, the blood flows out till the animal be dead.

5. Any thin liquid, when injected into an artery, does not paſs backwards into the heart, but flows forward into the inoſculating veins. On the other hand, ſuch a liquid thrown into a vein, flows towards the heart, and not into the ſmaller branches of the vein.

The phenomena of circulation in the human body have been already mentioned under ANATOMY, ſect. xii. and [illegible] and under MEDICINE, Nº [illegible]. We ſhall here only offer a comprehenſive view of the courſe of the blood in the adult and in the fœtal ſtate.

198 Circulation in the adult human.

I. After birth, the blood coming from every part of the body through the numerous ramifications of the vena cava, is poured into the right or pulmonic auricle of the heart, by the contraction of which it is thrown into the right or pulmonic ventricle, which contracting, throws it into the pulmonary artery, being prevented from regurgitating into the auricle by the action of the tricuſpid valves. It is now, by means of the ramifications of the pulmonary artery, diſtributed through the lungs, from which it is brought back by four principal pulmonary veins, and poured into the left or ſyſtemic ventricle, which contracting with great force, propels it into the aorta, it being prevented from regurgitating into the auricle by the action of the mitral valves. The blood being propelled into the aorta, is by its trunk and branches, diſtributed to every part of the body, and brought back as before by the ramifications and trunks of the *vena cava*.

199 Circulation in the human fœtus.

II. In the fœtal ſtate, the blood being brought back from every part of the body by the ramifications and trunks of the vena cava, is poured into the pulmonic auricle of the heart, where it is mixed with the blood brought from the placenta. A part of this blood is conveyed from the ſinus of the auricle while in a ſtate of dilatation, through the oval hole, into the ſyſtemic auricle; while another part, by the contraction of the auricle, is thrown into the pulmonic ventricle, which contracting, propels it into the root of the pulmonary artery. From this the greater part of the blood paſſes through the arterial canal, that in the fœtus joins the pulmonary artery to the aorta, into this latter; while the remainder is diſtributed by the ramifications of the pulmonary artery on the lungs, and brought back by the pulmonary veins to the ſyſtemic auricle of the heart. By the contraction of this auricle, the blood is thrown into the ſyſtemic ventricle, which contracting, propels it into the aorta. Now, while one part of the blood is diſtributed by the numerous ramifications of the aorta to every part of the body of the fœtus, another part is carried from the internal iliac arteries, through the two umbilical arteries, into the placenta, from which it is conveyed through the umbilical vein to the ſinus of the liver. Here, one part of the blood, without entering the liver, is conducted by a branch of the umbilical vein, called *ductus venoſus*, to the left branch of the *vena cava hepatica*; thence to the inferior great vena cava; while another part, by another branch of the umbilical vein, flows into the left branch of the *vena portæ*, by the numerous ramifications of which it is diſtributed to the liver. From the liver it is carried by the *venæ cavæ hepaticæ* into the inferior great *vena cava*, whence it is conveyed with the reſt of the blood, to the pulmonic auricle of the heart, to be diſtributed as before.

We muſt now briefly conſider the powers by which the blood is made to circulate through [illegible] of veſſels, so [illegible] and differing so much in their diameter. It ſeems generally allowed at the preſent day, that theſe powers are chiefly the immediate muſcular action of the heart, the action of the arteries, the valves of the veins, and the preſſure produced on ſome of the veins by the action of the muſcles that lie contiguous to them.

1. That the heart muſt poſſeſs very conſiderable force in propelling the blood through the arteries, may be inferred from the great muſcularity of its ventricles; and this force has been proved by experiment and obſervation. From experiments made by Hales, viz. that of inſerting a glaſs tube into a large artery, and meaſuring the height to which the blood aſcends at each pulſation, it has been calculated, that the human carotid artery is capable of projecting its blood to a perpendicular height of ſeven feet and a half; and if we eſtimate the ſurface of the ſyſtemic ventricle at 15 ſquare inches, we ſhall find that it ſuſtains a preſſure of 135 cubic inches, equal to 51 pounds weight, which it has to overcome by its contractile force*. This is [illegible] computation of the force of the heart, for Borelli eſtimates it at 180,000 pounds, while Keill diminiſhes it to eight ounces. [illegible] that if a weight of 50 pounds be attached to the foot, with the knee of one ſide placed over the oppoſite knee, the weight will be raiſed at each pulſation, and allowing for the diſtance at which the weight is placed from the centre of motion, [illegible] the force of the heart at [illegible]. [illegible] the blood projected from the carotid [illegible] feet. [illegible] calculation, [illegible] the quantity of blood contained in the body at [illegible], the number of pulſations in each minute at [illegible], and the quantity of blood expelled from the ventricle at each contraction [illegible], we ſhall find that the whole [illegible] pounds of blood will be conveyed through the whole body in less than [illegible] in an hour, or the circulation will be completed in leſs than three minutes. From these circumſtances we muſt infer that the impelling power of the heart is very great, and fully adequate to the effect which it has to produce.

Various hypotheſes have been formed to explain how the heart and arteries are excited to action, but our limits will not permit us to detail them. Our readers will find them related at conſiderable length, and well examined in the *Elements of Phyſiology* of D[illegible]

iii. p. 332—364. The general opinion at preſent entertained on this ſubject is, that the heart is excited to action by the ſtimulus of the blood.

202 Action of the arteries

2. Although it is more than probable that the action of the heart is the principal inſtrument in carrying on the circulation, there can be no doubt that the arteries contribute eſſentially to this office. They are evidently muſcular, and are poſſeſſed of conſiderable irritability; are ſupplied with numerous nervous filaments, and are nouriſhed by ſmall arterial branches, commonly called *vaſa vaſorum*. Nay, we know that they are ſuſceptible of contraction; for when we divide an artery in the living body, the divided extremities gradually contract, till, if the animal is not killed by the experiment, the aperture is at length obliterated *. Laſtly, there have been inſtances of fœtuſes without a heart; and as we muſt ſuppoſe that, during the life of the fœtus, the circulation was going on, it is a natural inference that this was chiefly effected by the contraction of the arteries, and not entirely by the impelling power of the circulating ſyſtem of the mother.

203 Valvular ſtructure of the veins.

3. It cannot be ſuppoſed that the veins have any immediate action on the blood, as they exhibit no circular fibres like the arteries, except in the immediate vicinity of the heart; but their valvular ſtructure muſt contribute to the carrying on of the circulation, from the oppoſition it gives to the return of the blood, ſo that what is called the *vis à tergo*, or impelling power from behind, aided by the conical form of the veins, may have its full effect.

204 Action of the muſcles.

4. That the action of the muſcles has conſiderable influence in propelling the blood towards the heart, in thoſe veins that lie in their neighbourhood, is evident from the effect that bodily exerciſe produces in accelerating the circulation, and from the efficacy of friction in removing congeſtions of blood in the veins of the extremities, and in the more familiar inſtance of promoting the ſwelling of the veins of the arm by the ſame means in the operation of bleeding.

205 Circulation of the inferior animals.

The circulation in thoſe animals whoſe ſtructure approaches to that of man, differs little from what is above deſcribed. There are indeed ſome peculiarities, a few of which we ſhall preſently notice. An account of the circulation in the cetacea will be found in the article CETOLOGY, N° 140—145, that of the reptiles is deſcribed under ERPETOLOGY, page 309.

206 Circulation of the molluſca.

The molluſca poſſeſs an evident and powerful circulation. Moſt of them have a ſimple heart, conſiſting of one auricle and one ventricle; and in theſe the vena cava performs the office of an artery, carrying the returning blood to the gills, whence it paſſes to the auricle, and is afterwards thrown into the aorta. There is a peculiarity in the cuttle fiſh, which has a heart conſiſting of three ventricles, without any part that can properly be called an auricle. Two of the ventricles are placed at the roots of the two bronchiæ, and have each a branch of the vena cava, by which they receive the blood from the body, and propel it into the bronchiæ. The returning veins open into the middle ventricle, and from this the aorta proceeds.

207 in the vermes;

Some of the vermes, as the leech, and the tribes of the *naias*, *nereïs*, and *aphroditæ*, and ſome ſpecies of *lumbricus*, have no heart, but they have circulating veſſels with evident contraction and dilatation.

208 in cruſtaceæ.

In the *cruſtacea*, the circulation is performed by a ſingle ventricle, expelling the blood into the arteries of the body, and receiving it again after it has paſſed through the gills, in a manner very ſimilar to the circulation of fiſhes.

209 Contracting and dilating tube in inſects.

There is no circulation in inſects; but theſe animals have running along the back a membranous tube, in which alternate contractions and dilatations are perceptible. This tube, however, is cloſed at both ends, and has no veſſels proceeding from it.

210 No circulation in plants,

From the reſearches which evince circulation to be a function ſo general among animals, ſome are diſpoſed to think it takes place in all living bodies. But notwithſtanding the faſhionable language of circulating fluids, of veins, arteries, and even of valves, in the vegetable ſtructure; yet nothing performing the office of a heart, and nothing that ſeems to conduct fluids in a circular courſe, has been found in plants. In the vegetable kingdom, the chyle is diſtributed to all the parts, from the numerous veſſels which convey the ſap; and theſe veſſels, being fitted by their ſtructure to carry the ſap either downwards or upwards, from the branches to the roots, or from the roots to the branches, is the reaſon why plants inverted in the ground will ſend forth roots from the place of their branches, and ſend forth branches from the place of their roots. Even a ſimilar diſtribution of the chyle takes place in ſome animals. In the human tænia, in the *faſciola hepatica* (fluke) of ſheep, and in moſt polypes, the chyle, without a circulating ſyſtem, is conveyed directly to the different parts from the alimentary canal.

211 nor in ſome animals.

For an account of the motion of ſap in plants, ſee Darwin's *Phytologia*, a paper by Mr Knight in the *Philoſophical Tranſactions* for 1801, Wildenow's *Principles of Botany*, ſect. 276, and the article PLANT in this Encyclopædia.

212 Relations between circulation and ſenſation.

The relations that ſubſiſt between the function of circulation, and thoſe which we have already conſidered, are very important. We ſhall begin with thoſe of circulation and ſenſation. That the functions of the nervous ſyſtem muſt be conſiderably influenced by the circulation of the blood, may be ſuppoſed *à priori*, from the large quantity of blood ſent to the head, this being, on a moderate calculation, about one-tenth of the whole. A certain quantity of blood in the veſſels of the brain ſeems eſſential to the due performance of the functions of that organ; and thoſe animals, which, like man, have the blood ſent in greateſt quantity, and with greateſt impulſe, ſeem to poſſeſs the faculties of the brain in the greateſt perfection, while thoſe in whom the motions of the blood towards the head is much retarded, as in the ſheep and cow, are remarkable for mildneſs and ſtupidity. When, however, the quantity of blood becomes too great, or its impetus too violent, the faculties of the brain are impaired, or altogether deſtroyed. No man, and very few other animals, can remain ſuſpended with the head downwards for any long time, without dangerous, and commonly fatal conſequences. The bat, indeed, is a remarkable exception to this rule, for this animal can hang by its hinder feet for days or weeks together, with perfect ſafety, a circumſtance that may be accounted for from the very ſmall quantity of blood contained in its circulating veſſels. Again, the brain exerts an evident influence on the circulation. It is well known how much the action of the heart and arteries is quickened, impeded, or rendered irregular, by the paſſions of the mind. Caſes are recorded in which theſe paſſions, carried to exceſs, have altogether ſtopped the circulation, and produced inſtant death. Fainting is often brought on by the ſight of a diſguſting or terrifying object, or by the odour of perfumes, or of ſubſtances to which the perſon has a particular antipathy. The ſympathy between the heart and the nervous ſyſtem is farther ſhown by the violent pain below the *ſternum*, and ſometimes in the arm, in caſes of organic diſeaſe of the heart.

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* Hunter on the blood, p. 114.

The circulation is even affected by intenſe thought; and we have heard of a bleeding from the noſe being brought on by long and deep ſtudy, while the body was in a reclining poſture, namely in bed.

213 Relations between circulation and motion.

The functions of circulation and motion are intimately related. It is ſcarcely neceſſary to notice the acceleration of the pulſe, in conſequence of exerciſe and labour, or to remark that in indolent and ſedentary people the circulation is generally ſlow and languid. In general, too, the blood circulates with moſt rapidity in thoſe animals who are formed for quick motion, though the inſtance above quoted, of the bat, ſhows that the quickneſs of motion does not depend on the quantity of blood. Several curious anatomical facts have rendered it probable, that the production of quick or ſlow motion depends in a great meaſure on the mode in which the arterial branches are diſtributed to the moving organs. The arterial branches that ſupply the organs of voluntary motion, are divided in ſuch a manner as to impede the motion of the blood towards theſe organs as little as poſſible: their ramifications are therefore few, and they go off from the trunk at very acute angles; whereas thoſe that ſupply the viſcera are at nearly right angles, are often tortuous, and are otherwiſe ſo conſtructed as frequently to impede the flow of blood. Phyſiologiſts have even explained the greater power that is generally found in the right arm, and the greater readineſs with which moſt people uſe that arm, by the manner in which the right ſubclavian artery comes off from the aorta. This indeed we are diſpoſed to conſider as fanciful, and to attribute the more ready uſe of the right arm ſolely to habit and early inſtruction not to employ the left.

214 Diſtribution of the arteries in the limbs of ſlow-moving animals.

In ſome animals that are remarkable for ſlowneſs of motion, as the *lemur tardigradus*, or ſlow lemur, and the *bradypus tridactylus*, or common ſloth, there is a curious conſtruction of the arteries that are diſtributed to the limbs of theſe ſlow-moving animals, which muſt have the effect of breaking the force, and impeding the velocity of the blood towards theſe limbs. In the *lemur tardigradus*, a ſpecimen of which was diſſected by Mr Carliſle, it was found that the *ſubclavian artery* and the *external iliac* were, ſoon after riſing from the general trunk, divided into a great number of equal-ſized cylinders ſurrounding the principal artery, now diminiſhed to a very ſmall ſize, and that each of theſe branches was ſent to each of the principal muſcles of the limbs, while the other arteries that ſupplied the other parts of the limbs were divided in the uſual arboreſcent form. Struck with this appearance, Dr Shaw and Mr Carliſle afterwards examined ſeveral ſpecimens of the ſloth, and found a ſimilar conformation, while in other ſpecies of bradypus, not remarkable for ſlow motion, no ſuch appearance took place *. Fig. 5. & 6. Plate CCCCXVIII. repreſent the diviſion of the arteries in the ſlow lemur above deſcribed.

215 [illegible] with digeſtion.

The relations between the circulating and digeſtive organs are proved by the ſudden acceleration of the pulſe from ſtimuli received into the ſtomach; from the diminiſhed circulation or ſudden ceſſation of the heart's motion from powerful ſedatives received into the ſame organ, eſpecially the *prunus lauro-ceraſus*; from the irregularity produced in the circulation in conſequence of *dyſpepſia*, and many other conſiderations.

216 Relation of circulation and abſorption.

That there is an intimate relation between circulation and abſorption, cannot be doubted, though the nature and effects of this relation are not yet well underſtood. We know that the veſſels ſympathize with the abſorbents in their activity or languor; that when the abſorbents are languid in their action, the blood-veſſels, eſpecially the exhalants, are in a feeble or relaxed ſtate, and that the abſorbents are often rouſed to greater action by remedies that firſt act on the circulation.

217 [illegible] the veſſels [illegible]

Numerous experiments have ſhown how much the colour and conſiſtence of the blood are altered by the mere action of the veſſels; and this diſcovery has enabled us to conjecture with more probability than we did formerly, why in infants and phlegmatic perſons the blood is paler, in the choleric more yellow, and in the ſanguine of vermilion red. It explains likewiſe in ſome meaſure, why the blood varies in the ſame individual, not only with regard to the ſtate of health, but likewiſe at the ſame inſtant; and why the blood which circulates through the veins has not the ſame intenſity of colour, nor the ſame conſiſtence, as that of the arteries; and why the blood which flows through the organs of the breaſt differs from that which paſſes languidly through the viſcera of the lower belly. This power of the veſſels over the blood will bring us alſo to the true cauſe why the veſſels vary in the denſity of their coats and in their diameters; why they are ſometimes convoluted in a gland, and why they ſometimes depoſit their contents in a follicle; why they are ſometimes of a ſpiral form; why the branches ſtrike off at various angles; why they are variouſly anaſtomoſed; why they ſometimes carry the blood with diſpatch, and ſometimes ſlowly through a thouſand windings. By theſe means their action is varied, and the blood prepared numerous ways to anſwer the ends of nutrition and ſecretion.

On the varieties of the *pulſe*, and the morbid affections of circulation, ſee Medicine, N° 90—104.

Chap. VIII. *Of Reſpiration.*

218 Nature of reſpiration.

While the fluids are paſſing through the body, by what is called the *greater circulation*, they give out certain parts or principles, partly for the purpoſe of nutrition, and partly to free the ſyſtem from noxious matters. In order to regain ſome of the principles which they have loſt, it is neceſſary that they ſhould be expoſed to the influence of atmoſpheric air; for which purpoſe they are made to paſs through appropriate organs, which, as we have already obſerved, are in general either lungs or gills. The action by which the fluids and the air are made to act on each other, is called *reſpiration*, and conſiſts of two kinds, *inſpiration*, by which the air is received into the body, and *expiration*, by which it is again thrown out.

So eſſential is reſpiration to the ſyſtem, that ſnails, chameleons, and ſome other animals, can live for years, without any apparent nouriſhment, provided they be not excluded from air. We have feen a chameleon that lived, and was vigorous, for 22 months, without any food, and which might have continued to live much longer, but for an unfortunate bruife by a fall.

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* *Shaw's General Zoology*, vol. i.

Other phenomena equally demonftrate the importance of air to the living body. The frog leaps away wanting its heart; it furvives the lofs of the greateft part of its fpinal marrow; without its head, it lives for fome days, and its heart continues to circulate its blood. Borelli found, that eels and ferpents, though their bodies be opened, and the whole of their bowels be taken out, are able to move for a day after, and yet, in all thefe animals, the life is obferved to be fuddenly extinguifhed when the all-vivifying air is excluded. Even the fmalleft infect has died, and the plant loft its vegetative power, when retained for any confiderable time in a vacuum. Fifhes themfelves, when placed under an exhaufted receiver, have ftarted anxioufly to the furface of the water in queft of frefh air; and finding none, have funk to the bottom and expired in convulfions. It will prefently appear that this neceffity of air to life is general in all the claffes of organized beings (K).

219 Organs. The organs of refpiration belonging to the human fyftem, viz. the *larynx*, windpipe, lungs, diaphragm, ribs, and numerous mufcles, have been fufficiently defcribed in various parts of the article ANATOMY; and fome account of thefe organs in the inferior animals has been given in the fecond part of that article, N° 155, 156, 206, 208, 271—274, and in the articles CETOLOGY, ERPETOLOGY, and ICHTHYOLOGY. For a more complete account of the refpiratory organs in the inferior animals, the reader is referred to Cuvier's *Leçons d'Anatomie Comparée*, Leç. xxvi. et xxvii. and to Blumenbach's *Comparative Anatomy*, chap. xiv. and xv.

220 In examining the function of refpiration in warm-blooded animals, two circumftances are principally to be confidered; the mechanifm of refpiration, or the mechanical means by which the organs are enabled to receive and expel the air, and the effects produced by refpiration on the circulating fluids, and on the fyftem at large. Our principal object in this article is briefly to explain the mechanifm of refpiration; to notice the effects produced on the air by the refpiration of different animals, with the effects produced on them, and the relations that take place between refpiration and the preceding functions of fenfation, motion, digeftion, and circulation.

221 Mechanifm of refpiration in man. In order to make an infpiration, the intercoftal mufcles, and the mufcular fibres of the diaphragm, are thrown into contraction, while at the fame time the abdominal mufcles, and the mufcular fibres of the windpipe, are relaxed. By thefe means the diaphragm being drawn towards the *facrum*, and rendered lefs convex towards the cheft, and the ribs being drawn upwards (or forwards in quadrupeds), the cavity of the cheft is enlarged, and the air remaining in the lungs being rarefied, the external air rufhes in through the windpipe by its own gravity, and diftends the lungs. In making what is called a very deep infpiration, other mufcles that are connected with the atlantal ribs, viz. thofe called *fcaleni*, *trapezii*, *cervicales defcendentes*, *ferrati fuperiores*, and pectoral mufcles, affift to elevate the ribs more than in an ordinary infpiration. By the action of the intercoftal mufcles the ribs are drawn *atlantad* (upwards in man, and forwards in quadrupeds), becaufe the moft atlantal rib on each fide of the thorax is fixed, and therefore all the other ribs are drawn towards it; and they are alfo drawn peripherad (outwards), becaufe their greater curvature is in the direction of the *facrum*, and becaufe they turn on their vertebral extremities as on a fulcrum.

In order to make an expiration, the abdominal mufcles, and the mufcular fibres of the windpipe, are contracted, while the intercoftal mufcles, and the mufcular fibres of the diaphragm are at the fame time relaxed. By thefe means, aided by the elafticity of the cartilages of the ribs, and perhaps of the mediaftinum, the ribs are drawn facrad (towards the facrum), while the diaphragm, partly by its own mufcular action, and partly in confequence of the preffure of the bowels, is rendered convex towards the cheft. Thus, this cavity is confiderably diminifhed, the lungs are compreffed, and part of the air is expelled through the windpipe. In making a ftrong expiration, little more is neceffary than a more powerful contraction of the abdominal mufcles.

222 In other animals. The mechanifm of refpiration in mammalia is fo fimilar to that of man, that we need not enter into it; that of *cetacea* has been fufficiently explained under CETOLOGY, N° 146—151; that of birds may be gathered from what has been faid on their ftructure, in the comparative part of ANATOMY, N° 271, and in ORNITHOLOGY, N° 37; that of reptiles has been fully explained under ERPETOLOGY, page 311; and that of fifhes under ICHTHYOLOGY, page 73. The mechanifm of this function in the claffes of animals below thefe is fo fimple, that a confideration of it is unneceffary. In infects the air enters the numerous ramifications of the *tracheæ*; is carried by them into every part of the body, and is then returned by the fame paffages. In fome of the mollufca, refpiration proceeds in a fimilar manner, by the ramifications of the pulmonary veffels that enter by the neck; but in moft of thefe, and in all the loweft tribes, fuch as worms and zoophytes, refpiration feems to be carried on entirely by the pores of the fkin.

223 Quantity of air received and emitted. Many attempts have been made to afcertain the quantity of air received and emitted in a fingle infpiration or expiration. See CHEMISTRY, N° 2535. This point is not yet fully afcertained, but we may probably eftimate the quantity expelled by each ordinary exfpiration at one-feventh part of the whole contents of the lungs, and that of the moft violent expiration at about four-fevenths

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(K) It was long ago obferved by Pliny, that if the bodies of infects are befmeared with oil, they foon perifh: "*oleo illito infecta omnia exanimantur.*" The fame obfervation wa safterwards made by Ray, who explained it by fhowing that in this way the pores through which the animals breathe are ftopped. Mayow alfo found, that if the oil be applied only to fome of thefe pores, the neighbouring parts become paralytic, while the reft of the body continued found. See Ray's *Wifdom of God*, and Mayow's *Tractatus*.

Of Respiration.

ſevenths of that quantity; or that the medium quantity of air conſumed during a common inſpiration or expiration is about 40 cubic inches *.

224 Ordinary number of respirations in a minute.

Another circumſtance reſpecting the mechaniſm of reſpiration merits notice, viz. the ordinary number of reſpirations made in a minute by a healthy perſon. This varies conſiderably in different ſubjects, being in general greateſt in children, and leaſt in old perſons. Dr Hales eſtimated the number of 20 in a minute; the ſubject of Dr Menzies' experiments reſpired only 14 times in the ſame period, while Mr Davy reckons his reſpirations at between 26 and 27; the ſubject of the experiments made by Meſſrs Allen and Pepys, breathed about 19 times in a minute, and with this Dr Thomſon's experience agrees. The average of all theſe is about 20, which we may probably conſider as a tolerably juſt eſtimate. Much, however, will depend on the circumſtances in which the perſon is placed; on his habits of activity or indolence, of temperance or intemperance; on the ſtate of the atmoſphere, &c.

225 Experimental writers on reſpiration.

The chemical changes produced on the air by the reſpiration of animals have been deſcribed, ſo far as they were then known, under CHEMISTRY, N° 2555. Since that article was written, however, ſeveral valuable obſervations have been publiſhed, and the moſt important of theſe muſt be here noticed; but as we cannot, in this place, give any thing more than a ſummary ſketch of theſe obſervations, we ſhall here enumerate the principal works that have appeared on this experimental part of our ſubject. The chemical phyſiologiſts who have been moſt conſpicuous in theſe reſearches are, Mayow (in his *Tractatus de Reſpiratione*, or the *Analyſis* of his works by Beddoes); Prieſtley (*Experiments and Obſervations on Air*); Lavoiſier (*Traité Elementaire de Chimie*, *Phyſical and Chemical Eſſays*, and a work on *Atmoſpheric Air*); Goodwyn (*On the Connection of Life with Reſpiration*); Coleman (*On Suſpended Reſpiration*); Menzies (*On Reſpiration*); Spallanzani (*Memoires ſur la Reſpiration*, tranſlated into French by Senebier, and ſince into Engliſh, and *Rapports de l'Air avec les Etres Organiſés*, &c. alſo collected by Senebier); Davy (*Reſearches Philoſophical and Chemical, into the Nature of Nitrous Oxide*; Ellis (*Inquiry into the Effects produced on Atmoſpheric Air by Reſpiration*), and Allen and Pepys (*Philoſophical Tranſactions*, 1808, Part II. or *Phil. Mag.* vol. xxxii.). Moſt of the facts obſerved by theſe experimentaliſts, except thoſe of the three laſt mentioned, have been collected by Dr Boſtock, in his *Eſſay on Reſpiration*, by Dr Thomſon in his *Syſtem of Chemiſtry*, vol. v. third edition, and by Mr Johnſon in his *Animal Chemiſtry*, vol. iii.

226 Aſcertained changes on reſpired air.

The following changes produced on air that has been reſpired by warm-blooded animals, ſeem to have been fully aſcertained; viz. 1. That the reſpired air generally ſuffers a ſenſible diminution of bulk; 2. That it loſes a part of its oxygenous portion; 3. That it acquires an additional quantity of carbonic acid gas; 4. That it is charged with watery vapour. We ſhall reſume theſe facts, and conſider the additional information which has been acquired reſpecting them ſince the publication of our article CHEMISTRY.

227 Its volume ſenſibly diminiſhed.

1. *Atmoſpheric air generally ſuffers, by the reſpiration of warm-blooded animals, a ſenſible diminution in its bulk.*—The reſults of the experiments made by different chemiſts on the diminiſhed volume of reſpired air, are exceedingly various. Mr Davy makes the diminution amount to one-eighteenth † of the whole air inſpired; Lavoiſier and Goodwyn eſtimate it at no more than one ſixtieth ‡, and Dr Boſtock ſo low as one eightieth §; while Crawford and ſome later experimentaliſts could perceive no diminution. Dr Thomſon ſtates the reſults of his experiments upon this ſubject to be, that in ſome caſes he could perceive no diminution at all, while in others it was perceptible. It was greateſt when the animal was taken out repeatedly during the experiment, or when he employed air purer than that of the atmoſphere. He is diſpoſed to conſider the diminution as accidental, and as owing to ſome abſorption of air, altogether independent of reſpiration, and exceedingly various in different circumſtances ‖. In the experiments of Meſſieurs Allen and Pepys, the general average of the deficiency in the total amount of common air inſpired, appeared to be very ſmall, amounting to about ſix parts in 1000, and they are inclined to attribute it, in a great meaſure to the difficulty of exhauſting the lungs ſo completely after an experiment as before it *.

228 Part of its oxygen abſtracted.

2. *Atmoſpheric air, by the reſpiration of warm-blooded animals, loſes a part of its oxygen.*—From a compariſon of the experiments of Mr Davy, with theſe made by Lavoiſier juſt before his death, Dr Thomſon eſtimates the quantity of oxygen conſumed in a minute, by reſpiration, at 31.6 cubic inches, making in 24 hours 45,504 cubic inches; and he concludes that in a day a man conſumes rather more than 25 cubic feet of oxygen, and that he renders unfit in the ſame time, for ſupporting combuſtion and reſpiration, no leſs than 125 cubic feet of air †.

229 Carbonic acid gas acquired.

3. *Atmoſpheric air acquires, by reſpiration, an additional quantity of carbonic acid gas.*—The opinion of Dr Menzies, that the bulk of carbonic acid gas produced by reſpiration, is preciſely equal to that of the oxygen loſt, appears now to be fully confirmed. In Mr Davy's experiments they correſponded very nearly ‡, and in thoſe of Mr Dalton and Dr Thomſon, they correſponded exactly. The latter chemiſt found, on the whole, that the bulk of oxygen which diſappeared was ſomewhat greater than that of the carbonic acid generated; but the difference varied conſiderably, and kept pace with the diminution of the bulk of air reſpired. Hence he conſiders it as owing to the abſtraction of part of the air by ſome other way than reſpiration, and allowing for this abſtraction, he has no doubt that the bulk of the carbonic acid formed is preciſely equal to that of the oxygen that has diſappeared. He is diſpoſed to conſider the abſolute quantity of carbonic acid generated in 24 hours, as ſomething leſs than 40,000 cubic inches on an average ‖. The following reſults of the experiments made by Meſſieurs Allen and Pepys, as theſe were made on a large ſcale, may be conſidered as quite ſatisfactory on this head. 1. It appears that the quantity of carbonic acid gas emitted is exactly equal, bulk for bulk, to the oxygen conſumed. 2. Atmoſpheric air once entering the lungs, returns charged with from 8 to 8½ per cent. carbonic acid gas, and when the contents are repeated almoſt as frequently as poſſible, only 10 per cent. is emitted. When the inſpirations and expirations are more rapid than uſual, a larger quantity of carbonic acid is emitted in a given time; but the proportion is nearly the ſame, or about

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* Boſtock on Reſpiration, p. 35.

† Reſearches, p. 435.

‡ Reflect. on Reſpiration, p. 17.

§ Ib. p. 19.

‖ Syſtem of Chemiſtry, vol. v. p. 735.

* Phil. Mag. vol. xxxii.

† Syſtem of Chemiſtry, vol. v. p. 736.

‡ Reſearches, p. 431.

‖ Syſtem of Chem. vol. v. p. 735.

eight per cent. The proportions of carbonic acid gas, in the firſt and laſt portions of a deep inſpiration, differ as widely as from 3.5 to 9.5 per cent. 3. It appears that a middle ſized man, aged about 38 years, and whoſe pulſe is 70 on an average, gives off 302 cubic inches of carbonic acid gas from his lungs in 11 minutes; and ſuppoſing the production uniform for 24 hours, the total quantity in that period would be 39534 cubic inches, *(agreeing almoſt exactly with Dr Thomſon's eſtimate)* weighing 18,683 grains, the carbone in which is 5363 grains, or rather more than 11 ounces troy; the oxygen conſumed in the ſame time will be equal in volume to the carbonic acid gas; but it is evident, that the quantity of carbonic acid gas emitted in a given time, muſt depend very much upon the circumſtances under which reſpiration is performed; and here it may be proper to notice, that all theſe experiments were made between breakfaſt and dinner. 4. A larger proportion of carbonic acid gas is formed by the human ſubject, from oxygen than from atmoſpheric air *.

230 Watery vapour acquired.

4. *Atmoſpheric air returns from the lungs charged with aqueous vapour.*—Of this circumſtance there is no doubt, but the quantity of water contained in the expired air, and the ſources from which it is derived, are ſtill in diſpute. Dr Thomſon eſtimates the former at about 19 ounces per day; but he does not lay much ſtreſs on the reſults of his own experiments, as they were not ſufficiently varied to give a fair average. As to the ſources of this watery vapour, it has been generally ſuppoſed, that the water is formed in the lungs by a combination of part of the oxygen conſumed with hydrogen evolved from the venous blood. This, however, is mere hypotheſis. It has not been proved that hydrogen is evolved from the blood; and as the quantity of oxygen conſumed appears to be taken up in forming the carbonic acid gas that is expired, there is none left to form water. No hydrogen, or any other gas, except carbonic acid and azotic gas, appear to be evolved during the proceſs of reſpiration †.

231 Is azote loſt?

There is another change ſuppoſed by moſt chemical phyſiologiſts, to be produced on the air by reſpiration, namely the loſs of part of its azote; but this is ſtill diſputed. Dr Boſtock concludes it to be probable, that a ſmall portion of azote is loſt, which he eſtimates on an average at $\frac{1}{100}$ of the air reſpired, making in 24 hours, about 4.5 ounces, or four cubic feet ‡. Mr Davy found the conſumption of azote to amount to about one ſeventh of that of oxygen ||; and ſome late experiments of Dr Henderſon afford a ſimilar reſult, though in theſe the proportion is rather leſs §. Dr Thomſon alſo found a loſs of azote, but it was extremely inconſtant, ſometimes being ſcarcely perceptible, at others conſiderable. It kept pace with the diminution of the bulk of the air reſpired, and with the difference between the bulk of the oxygen conſumed, and the carbonic acid formed. He conceives that a portion of the air reſpired diſappears without undergoing any change, and that this portion occaſions the diminution of the azote, and the difference between the bulk of the carbonic acid formed, and that of the oxygen conſumed. He thinks it conceivable, that the diſappearing of ſuch a portion may be confined to the unnatural circumſtances occaſioned by the experiment; that the difficulty of throwing out the air from the lungs in theſe circumſtances, may be ſuch as to induce abſorbents to act, and remove a portion which in the ordinary ſtate of the lungs would have been thrown out by expiration *.

232 Changes on the air by the reſpiration of the inferior animals.

Experiments on the changes produced on atmoſpheric air and oxygenous gas, by the reſpiration of the inferior animals, have been made chiefly by Vauquelin, Spallanzani, and Mr Davy, and ſome of them have been repeated and varied by Mr D. Ellis. From all theſe experiments we find, that, by the reſpiration of amphibia, of fiſhes, of inſects, of molluſca, and of worms, the air in which they have been confined ſuffers changes analogous to thoſe produced in it by the reſpiration of the warm-blooded animals; that the oxygenous part is diminiſhed, and that this diminution is moſt complete when inſects and worms have been confined in it; that carbonic acid gas is in all caſes produced, but that the quantity produced varies in different animals, that fiſhes live for the ſhorteſt time, and amphibia and worms for the longeſt, when confined in a certain quantity.

From the lateſt experiments made by Spallanzani, on the effects both of living and dead animals, on atmoſpheric air, as collected by Senebier, that experimentaliſt has drawn the following concluſions. 1. In beginning with worms, and riſing up to man, there is no ſpecies of animal which does not deſtroy the oxygen of the atmoſphere after death, and deſtroy it entirely if it be kept incloſed in it, provided the quantity be not too great in proportion to the ſize of the animal; becauſe a conſiderable time is required when the volume of air is large, and a leſs time when the quantity is ſmall.

2. This deſtruction of oxygen by dead animals, is under ſimilar circumſtances ſlower than that effected by living animals, if we regard merely the effects produced by the cutaneous organ, independent of the action of the lungs.

3. He thought he had legitimately proved, that the deſtruction of oxygen by the cutaneous organ, is not occaſioned by the combination of this gas with the carbone of the animal; but that it is a true abſorption of that element, by the body of the animal deprived of life. It does not give out carbone, but carbonic acid, as he believed he had proved by unanſwerable experiments.

4. The abſorption of oxygen by animals cut into ſmall pieces, is greater than that occaſioned by animals entire in ſimilar circumſtances.

5. A cold-blooded animal of the ſame bulk, and in the ſame circumſtances as a warm-blooded animal, abſorbs more oxygen than the latter after death.

6. The ſkin is not the only part of an animal which abſorbs oxygen; all the parts, ſolid, fluid, and ſoft, not excepting the drieſt horny parts, as the nails of quadrupeds, the bill and feet of birds, produce the ſame effect †.

233 Effects of vegetation on the air.

It has long been known that plants would not vegetate, if excluded from atmoſpheric air. Papin confined an entire plant in the exhauſted receiver of an air-pump, and it ſoon periſhed; but on keeping a ſimilar plant in this vacuum, with only its leaves expoſed to the air, it continued to live for a long time ‡. When the leaves of a plant are ſtript off, or blighted by inſects; when they have the upper ſurface ſmeared with oil, with varniſh, or laid upon water §, the plant dies in a few days. Hence it is evident that the leaves of a plant are neceſſary organs, and that there is produced on the air in which

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* *Phil. Mag.* l. xxxii. 265.

† *Phil. Mag.* xxxii. p. 209.

‡ *Eſſays on Reſpiration*, p. 100.

|| *Reſearches*, p. 433.

§ *Nicholſ. Jour.* 8vo. vol. viii. p. 44.

* *Syſt. Chem.* vol. v. p. 733.

† *Edin. Med. Jour.* vol. v. p. 109.

‡ *Darwin's Phytologia*, p. 51.

§ *Ellis's Inquiry*, p. 28.

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which the plant vegetates, ſome change eſſential to the healthy action of the plant. What this change is, has not been fully aſcertained. It is the general opinion, that the leaves abſorb a portion of the atmoſphere, and give out certain gaſeous products; and it is generally believed, that moſt plants have the property of giving out oxygenous gas during their expoſure to the light, and azotic gas or ſome other irreſpirable air in the dark. That oxygenous gas is neceſſary to vegetation, is fully proved; and it ſeems certain, eſpecially from the experiments of Mr Ellis, that under the ordinary circumſtances, carbonic acid gas is generated during their vegetation *. Mr Ellis, who is not ſatisfied with the accuracy of the experiments of Scheele and Prieſtley, ſeems to doubt whether plants at any time give out oxygenous gas; and thinks that the principal uſe of oxygen to them, is to combine with the ſuperfluous carbone produced by vegetation, and thus form the carbonic acid evolved.

234 Effects of reſpiration on the animal ſyſtem.

Having conſidered the effects produced on the air by the reſpiration of animals, and the vegetation of plants, we muſt now notice the effects produced by the exerciſe of the ſame function on the animal body, as the compariſon of theſe effects with the changes produced on the air itſelf, affords us the only clue to a rational theory of reſpiration.

235 Changes on the blood.

We have already ſtated (CHEMISTRY 2540), that during reſpiration, the blood changes from the dark colour which it has in the veins, to the bright ſcarlet of arterial blood. It has been found, that a clot of venous blood, when out of the body, aſſumes the bright tinge, when expoſed to the action of oxygenous gas; and that venous blood confined within a bladder, undergoes a ſimilar change, when the bladder is immerſed in oxygenous gas. It has been alſo found, that when arterial blood out of the body is expoſed to the action of irreſpirable gaſes, it loſes its bright colour, and aſſumes the purple hue of venous blood.

236 Increaſe of temperature.

It is fully aſcertained, that the heat of the body is chiefly kept up by reſpiration, See CHEMISTRY, N° 2545.

237 Theory of reſpiration.

Let us now conſider the moſt probable theories of reſpiration, chiefly as they are applicable to the human ſyſtem. Without ſtaying to notice the older hypotheſes that have been advanced to explain this function, we ſhall only ſtate the preſent moſt received doctrine, and mention the objections that have been lately made to it.

238 Theory of Allen and Boſtock.

This doctrine is ſtated in the following manner by Dr Boſtock, one of its moſt ſtrenuous defenders. "The blood ariſes at the right ſide of the heart, in a venalized ſtate, loaded with a quantity of the oxyde of carbone; as it paſſes through the pulmonary veſſels, it becomes ſubjected to the action of the air contained in the bronchial cells; a portion of the oxygen is removed from the air, part of which, forming an intimate union with the oxyde of carbone, is expelled in the form of carbonic acid gas, while the remainder is diſſolved in the blood." It is here neceſſary to remark, that it is not *oxygenous gas*, but *oxygen*, which is ſuppoſed to be mixed with the blood. The caloric thus ſet at liberty is employed, part of it in maintaining the temperature of the lungs, which would otherwiſe be cooled by the admiſſion of the external air; part of it in carrying off the aqueous vapour, and another portion in converting the carbonic acid into carbonic acid gas; but the greateſt part of it is united, in the form of ſpecific heat, to the arterial blood, which, by becoming arterialized, has its capacity for caloric increaſed. The arterial blood is poured into the left cavity of the heart, and propelled through the arteries into the extreme parts of the body. The oxygen which was diſſolved in the whole maſs of blood, during the circulation, gradually unites itſelf more intimately to a portion of the carbone in it, which it converts into the oxide of carbone, and thus the blood acquires the venous ſtate. By this change, its capacity for caloric is diminiſhed; the ſpecific heat which it obtained in the lungs, is given out in the capillary veſſels, to keep up the temperature of the body, and the blood returns to the right ſide of the heart completely venalized. This hypotheſis is nearly ſimilar to the one which was propoſed by M. M. La Grange and Haſſenfratz; it received ſome modifications from Mr Allen of Edinburgh, and was delivered by him nearly in the form which I have ſtated above, in his admirable courſe of phyſiological lectures. It was, I believe, firſt publiſhed in my Eſſay on Reſpiration *."

This doctrine, if ſufficiently eſtabliſhed, would explain the manner in which the blood becomes arterialized in the courſe of the circulation. It would alſo ſhew how, under particular circumſtances, the arterial blood may be venalized without leaving the arteries, and the venous blood arterialized without leaving the veins. It accounts for the gradual evolution of caloric in the capillary veſſels, during the courſe of the circulation, by the union which takes place between the oxygen and the carbone; whereas in the other hypotheſis, (ſee N° 241.;) this union is entirely completed in the lungs. It would allow a conſiderable time in which this union might be accompliſhed, and would likewiſe ſuppoſe the conſtituent parts to remain in perfect contact for an indefinite period. This hypotheſis would alſo explain how the oxygen is diſpoſed of, which is ſuppoſed not to be concerned in the formation of carbonic acid, and would likewiſe poſſeſs the advantage of ſuppoſing the exiſtence of a ſurplus quantity of oxygen, which being carried along the circulation, might be expended in a variety of uſeful purpoſes in the different parts of the animal economy. It would ſhew how the ſupply of matter which is poured into the blood by the abſorbents, is gradually incorporated with the maſs; and after the ſeparation of that portion, which is neceſſary for repairing the waſte of the different organs, the remainder is united to oxygen, and keeps up the temperature of the body; and, having afterwards no farther uſeful purpoſe to ſerve, it is diſcharged by the lungs †.

239 Objections.

Several objections, however, may be made to this theory. It is not proved that there is in natural reſpiration any abſorption of oxygen by the blood; for though much of the oxygenous portion of the atmoſphere is loſt, the quantity of carbonic acid generated is ſufficient to account for it. Mr Ellis has lately made very ſtrong objections to this ſuppoſed abſorption of oxygen, drawn chiefly from the anatomical ſtructure of the blood veſſels, and of the bronchial cells. He contends that the coats of the former, and the membranes bounding the latter, can ſcarcely admit the paſſage of air through them, much leſs that of the ſolid baſis of oxygenous gas, which baſis Dr Boſtock ſuppoſes to be the principle abſorbed. It is ſtill more improbable, according to Mr Ellis, that two ſolid baſes, namely thoſe of oxygenous gas, and of oxide of carbone, ſhould be at the ſame time paſſed through theſe reſiſting membranes; a ſuppoſition that is neceſſary in the hypotheſis juſt ſtated. Again, ſuppoſing that this abſorption of oxygen ſhould take place, from the affinity of the blood for this principle, it is not eaſy to conceive why this affinity ſhould ſo ſoon ceaſe, and why the blood ſhould again part with the oxygen, to the baſe of carbonic oxide ‡. Theſe objections are certainly very forcible; let us ſee how they have been anſwered.

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* Ellis's Inquiry, p. 39. et ſeq.

* [illegible] vol. iv. [illegible]

† [illegible] p. 167.

‡ Ellis's *Inquiry*, p. 117.—223.

240 anſwered.

Dr Boſtock, in an ingenious reply to Mr Ellis's objections, in invalidation of the firſt objection, quotes the well-known experiment of Dr Prieſtley, mentioned in N° 235. that venous blood becomes changed when expoſed to oxygenous gas, even though a bladder be interpoſed between them; and in controverting of the reſt, he ſeems chiefly to rely on the ſuppoſition that a greater quantity of oxygen is conſumed than is taken up in the formation of the carbonic acid. He alſo does not conſider it as *neceſſary* to ſuppoſe that either the oxygenous gas, or the oxygen itſelf, ſhould enter the blood veſſels, and ſhould afterwards be expelled from them; but only that a *part of the oxygen* ſhould be *attracted* by the blood, and after entering into a variety of new combinations, ſhould be diſcharged as a conſtituent of ſome of theſe new compounds. Without inquiring in what way the action between the blood and oxygen takes place; whether it be in conſequence of the mechanical ſtructure of the membranes, which permits the oxygen to paſs through their pores, or whether it be owing to the affinity of the blood for oxygen, which cauſes it as it were to become ſaturated with this ſubſtance before it tranſmits it; it appears to him ſufficient to ſtate, that oxygen and blood can act on each other, through a membrane which is very much thicker, and probably much denſer, than that which ſeparates the blood in the lungs from the air in the bronchial cells *.

* *Edin. Med. Jour.* vol. iv. p. 161. *et ſeq.*

241 Mr Ellis's opinion.

From a conſideration of the principal experiments on reſpiration that have been made by the ableſt chemical phyſiologiſts, and a compariſon of theſe with what he has himſelf made, Mr Ellis contends that no part of the air enters into the blood, but all the oxygen which diſappears is to be found in the carbonic acid produced; and that this carbonic acid is formed by the union of carbone emitted by the exhalant veſſels of the lungs, uniting with part of the oxygenous portion of the inſpired air †.

† *Edin. Med. Jour.* vol. iv. p. 327.

242 Objections

To this opinion Dr Boſtock, in the paper already referred to, makes the following objections; that this opinion does not explain how the regular ſupply of carbone is, at each ſucceſſive circulation, brought to the lungs in a ſtate proper to be diſcharged; and that it does not explain in what way the oxygen is employed, which is conſumed in reſpiration ‡.

‡ *Edin. Jour.* vol. iv. p. 163.

243 anſwered.

To the firſt of theſe objections (which, if it be proved that the whole of the oxygen is taken up in forming carbonic acid, is the only objection that can properly lie againſt his opinion), Mr Ellis replies, that the ſupply of carbone is derived from the digeſtive organs; but he does not conceive, as Dr Boſtock ſeems to imagine, that this is no ſooner received into the blood than excreted, or that the firſt operation which takes place in the ſanguiferous ſyſtem after it has received the ſubſtance which is to afford nutriment to the body, is to diſcharge the greateſt part of it. He regards carbone as a conſtituent part of the animal fluids, and he has endeavoured to ſhew, that it is emitted by the exhalants of the ſkin and inteſtines, as well as by thoſe of the lungs, producing in all caſes ſimilar changes on the air. Digeſtion he holds to be in no other way the ſource of the carbone in theſe fluids, than as it is the ſource of all the other principles which they contain. We know that all the phenomena of reſpiration are often exhibited for long periods where no digeſtive proceſs is carried on; but the functions of life muſt ſooner or later come to an end, if the various means of exhauſtion be not recruited by ſupplies through the digeſtive organs. It is only in this diſtant view that he conſiders digeſtion as the ſource of carbone; its immediate ſources are the exhalant functions of the body, which will afford carbone as long as they are ſupported by the motion of the blood, and will no longer yield it when the motion of the blood has ceaſed. But whether the exhalant functions continue or ceaſe, he conſiders that carbone exiſts abundantly, if not equally, in the ſerum and craſſamentum, in arterial and venal blood *.

* *Edin. Jour.* vol. iv. p. 327.

244 Theory of reſpiration ſtill incomplete.

On the whole, though the final cauſes of reſpiration, or the uſes to which it is ſubſervient in the animal economy, are now pretty well underſtood, we muſt acknowledge that the mode in which theſe beneficial effects are produced, has not yet been ſatisfactorily explained.

245 Uſes of reſpiration.

The principal uſes of reſpiration appear to be, 1. To bring about ſome beneficial change in the fluids of the body, and through them on the ſolids; 2. To preſerve the equable temperature of the body; and 3. In all thoſe animals that breathe by lungs to produce thoſe ſounds which ariſe from what we call *voice*.

246 Animal heat.

That animal heat is kept up chiefly by reſpiration, requires we think, no particular proof. It is well known, that thoſe animals which conſume moſt air during reſpiration, have the higheſt temperature. Birds in particular have the moſt extenſive breathing organs, and the temperature of theſe animals is higher than that of any other claſs. The reſpiration of reptiles, fiſhes, and moſt of the lower claſſes, is ſlow and languid, and the temperature of theſe animals is proportionally low. The heat of each ſpecies is, however, pretty uniform under ordinary circumſtances. That of the human body is generally about 98° of Fahrenheit. This however depends on the circumſtances in which it is placed. When much chilled by the action of cold, the temperature of the human body falls a degree or two below the ordinary height; and under the influence of violent fever, it riſes ſeveral degrees above it. The temperature is generally higheſt in children; and inſtances are recorded of theſe having ſurvived, while their mothers, to whoſe breaſts they clung, have periſhed from the ſeverity of cold.

247 Preſervation of equable temperature.

One of the moſt intereſting facts relating to the ſubject of animal heat, is the capacity of preſerving the equable temperature of their bodies, poſſeſſed by moſt animals. Man himſelf can live with little inconvenience in the frozen regions of Spitzbergen, and under the equatorial heats of Africa. He can even ſupport a greater degree of heat than is perhaps ever known to take place from the rays of the ſun, as is proved by the experiment of Drs Blagden and Fordyce in heated rooms; theſe gentlemen having remained for 15 minutes together in a heat exceeding 130°. The heat ſupported by ſome of the inferior animals is ſtill more extraordinary. A dog has been known to live for a conſiderable time in air heated to 260°, and ſtill the heat of his body was not raiſed more than 2° above its natural ſtandard. A frog has lived for more than 25 minutes when laid on flannel,

nel, heated from 95° to 106°. Fiſhes live very well at 72°; and Lucas, in his hiſtory of mineral waters, ſpeaks of carp that were living in a hot bath, whoſe temperature was at leaſt equal to that of the human body.

How this equable temperature is preſerved, cannot be completely explained. We know that the heat of the human body is commonly moderated by perſpiration; but in ſome caſes, as in that of Dr Fordyce alluded to above, where the heated atmoſphere was filled with watery vapour, this could have little effect. We can aſcribe it only to the action of the living principle.

248 Voice.

It was long ago obſerved by Ariſtotle, that thoſe animals only who poſſeſs lungs, have a true voice, and this opinion is confirmed by the experience of modern naturaliſts. We find, that only mammalia, cetacea, birds, reptiles and ſerpents, can utter vocal ſounds. Several tribes below theſe do indeed emit certain ſounds, eſpecially inſects; but theſe are owing to vibrations of the air in conſequence of the agitation of their external organs. It is only in mammalia and birds that the voice becomes an intereſting object of enquiry; for that of the cetacea is little more than blowing and grunting, and that of the other two claſſes is either hiſſing or croaking.

249 Amazing variety of the human voice.

Nothing can exceed, in variety and execution, the human voice; as will readily be allowed, if we conſider the complicated ſtructure of the human vocal organs, and the almoſt infinite variety of changes of which they are ſuſceptible. Dr Barclay has calculated theſe with great accuracy, proceeding on the principle, that where a number of moveable parts conſtitutes an organ deſtined to ſome particular function, and where this function is varied and modified by every change in the relative ſituation of the moveable parts, the number of changes produceable on the organ muſt at leaſt equal the number of muſcles employed, together with all the combinations into which they can enter. Now, the muſcles proper to the five cartilages of the larynx, are at leaſt ſeven pairs; and fourteen muſcles that can act ſeparately or in pairs, in combination with the whole, or with any two or more of the reſt, are capable of producing 16,383 different movements; not reckoning as changes the various degrees of force and velocity, nor the infinitely varied order of ſucceſſion by which they may occaſionally be brought into action. The number appears almoſt incredible; but to leſſen the ſurpriſe, it muſt be recollected that we ſpeak not here of the powers poſſeſſed by any individual, which will depend on habits and circumſtances, but of the powers of the vocal organs, conſidered in the abſtract, free from all the influence of cuſtom, equally indifferent, and equally diſpoſed to act in any order of ſucceſſion, in any combination, and with any degree of force and velocity of which their original powers were ſuſceptible.

If the powers we have mentioned appear aſtoniſhing, and able to account for many thouſands of theſe varieties obſerved among the voices of the human ſpecies, we have further to add, that the muſcles alluded to are only the proper muſcles of the *larynx*, or the muſcles reſtricted in their attachments to its five cartilages. Theſe are but a few of the muſcles of voice. In ſpeaking we uſe a great many more. Fifteen pairs of different muſcles, attached to the cartilages, or *os hyoides*, and acting as agents, antagoniſts, or directors, are conſtantly employed in preſerving the cartilages of the larynx ſteady, in regulating the place of their ſituation, or moving them as occaſion requires, upwards and downwards, backwards and forwards, and in every way, directly and obliquely, according to the courſe of the muſcular fibres, or in the diagonal between different forces. Theſe muſcles, independent of the former, are ſuſceptible of 1,073,741,823 different combinations; and co-operating with the ſeven pairs of the larynx, of 17,592,186,044,415, excluſive of the changes which muſt ariſe from the different degrees of force and velocity, and the infinitely varied order of ſucceſſion in which they may be brought into action.

But theſe are not all that co-operate with the larynx, either in forming or changing the voice; the diaphragm, the abdominal muſcles, the intercoſtals, and all that directly or indirectly act on the air, or on the parts to which the chondral and hyoidal muſcles are attached, contribute their ſhare. The *os hyoides* could not be raiſed unleſs the inferior jaw-bone were previouſly fixed by the *temporals*, *maſſeters*, and internal *pterygoids*; and a ſimilar aſſiſtance is likewiſe furniſhed by ſeveral other auxiliary muſcles that fix the head, *ſternum*, and *ſcapula*; to theſe we muſt add ſome pairs belonging to the *pharynx* and *iſthmus faucium*, and ſome alſo belonging to the tongue, which, combining with others, give to that organ an inconceivable variety of movement; and ſo quickly, that, in rapid utterance, they change its ſtate 3000 times in a minute. Thus Haller could articulate 1500 letters in a minute, which required 1500 contractions, and as many relaxations of the lingual muſcles †.

250 Mechaniſm of voice and ſpeech.

The principal organ of voice is the larynx, which is proved by the circumſtance that, when this is injured, the voice is either loſt, or rendered very indiſtinct. In ordinary reſpiration the chink of the glottis ſeems to be in a relaxed ſtate, and when this chink is contracted, voice is produced, and the ſound of the voice is more or leſs ſhrill, according as the *glottis* is more or leſs contracted. By this contraction of the glottis alone we can produce only inarticulate ſounds, varied indeed almoſt infinitely with reſpect to intenſity and tone, by the action of the muſcles. The production of ſpeech requires the action of the tongue, the lips, the palate, and the teeth; and the articulations are moſt complete, when all theſe parts are moſt perfect in their ſtructure, and in the moſt healthy condition. Too great length or ſhortneſs of the tongue, ſwelling of this organ in conſequence of inflammation, &c. imperfection of the palate, loſs of the teeth, ſwelling of the lips, all ſerve to render ſpeech imperfect and inarticulate. The ſtrength of the voice depends on the quantity of air expired, and on the contraction of the glottis; and conſequently thoſe animals who have the moſt capacious and moſt dilatable lungs, together with an ample cartilaginous and elaſtic larynx, will, other things being equal, have the ſtrongeſt voice.

251 Ventriloquiſm.

Among the various effects of the human voice, there is none more calculated to produce ſurpriſe in the hearers, than that extraordinary talent which ſome men poſſeſs of deceiving their hearers into a belief, that the ſounds which they utter do not proceed from the real ſpeaker, but from ſituations at a diſtance. This talent has been termed *ventriloquiſm*, from an idea that the voice of the ſpeaker proceeded not from the mouth, but from the belly. The moſt remarkable inſtance of this rare talent of which we have heard, is that of M. Fitz-James, who was formerly at Paris, and exhibited in London in the year 1803. Mr Nicholſon has given an

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† *Barclay's Anat. Nomen.* p. 70.

amuſing account of the performance of this ventriloquiſt, and we ſhall preſent part of it to our readers.

After ſome remarks on the nature of ventriloquiſm, which we ſhall notice preſently, and on the difficulty of aſcertaining the direction of the ſound, Mr Nicholſon thus proceeds :—" We ſhould ſcarcely be diſpoſed to aſcribe any definite direction to it ; and conſequently are readily led to ſuppoſe it to come from the place beſt adapted to what was ſaid. So that when he went to the door, and aſked in French (in which the whole performance was carried on), ' are you there ?' to a perſon ſuppoſed to be in the paſſage, the anſwer in the unuſual voice was immediately aſcribed by the audience to a perſon actually in the paſſage ; and upon ſhutting the door and withdrawing from it, when he turned round, directing his voice to the door, and ſaid, ' ſtay there till I call you,' the anſwer which was lower, and well adapted to the ſuppoſed diſtance, and obſtacle interpoſed, appeared ſtill more ſtrikingly to be out of the room. He then looked up to the cieling and called out in his own voice, ' what are you doing above ?' ' do you intend to come down ?' to which an immediate anſwer was given, which ſeemed to be in the room above, ' I am coming down directly.' The ſame deception was practiſed on the ſuppoſition of a perſon being under the floor, who anſwered in the unuſual, but a very different voice from the other, that he was down in the cellar putting away ſome wine. An excellent deception of the watchman crying the hour in the ſtreet, and approaching nearer the houſe, till he came oppoſite the window, was practiſed. Our attention was directed to the ſtreet by the marked attention which Fitz-James himſelf appeared to pay to the ſound. He threw up the ſaſh and aſked the hour, which was immediately anſwered in the ſame tone, but clearer and louder ; but on his ſhutting the window down again, the watchman proceeded leſs audibly, and all at once the voice became very faint, and Fitz-James in his natural voice ſaid, ' he has turned the corner.' In all theſe inſtances as well as others which were exhibited to the very great entertainment and ſurpriſe of the audience, the acute obſerver will perceive that the direction of the ſound was imaginary, and aroſe entirely from the well-ſtudied and ſkilful combinations of the performer. Other ſcenes which were to follow required the imagination to be too completely miſled to admit of the actor being ſeen. He went behind a folding ſcreen in one corner of the room, when he counterfeited the knocking at a door. One perſon called from within, and was anſwered by a different perſon from without, who was admitted, and we found from the converſation of the parties, that the latter was in pain, and deſirous of having a tooth extracted. The dialogue, and all the particulars of the operation that followed, would require a long diſcourſe if I were to attempt to deſcribe them to the reader. The imitation of the natural and modulated voice of the operator, encouraging, ſoothing, and talking with the patient ; the confuſion, terror, and apprehenſion of the ſufferer ; the inarticulate noiſes produced by the chairs and apparatus, upon the whole, conſtituted a maſs of ſound which produced a ſtrange but comic effect. Some obſervers would not have heſitated to aſſert, that they heard more than one voice at a time ; and though this certainly could not be the caſe, and it did not appear ſo to me, yet the tranſitions were ſo inſtantaneous, without the leaſt pauſe between them, that the notion might very eaſily be generated. The removal of the ſcreen ſatisfied the audience that one performer had effected the whole.

" His principal performance, however, conſiſted in the debates at the meeting of *Nauterre*, in which there were twenty different ſpeakers, and certainly the number of different voices was very great. Much entertainment was afforded by the ſubject, which was taken from the late times of anarchy and convulſion in France ; when the loweſt, the moſt ignorant part of ſociety, was called upon to decide the fate of a whole people by the energies of folly and brute violence. The ſame remark may be applied to this debate, as to the other ſcene reſpecting tooth-drawing ; namely, that the quick and ſudden tranſitions, and the great differences in the voices, gave the audience various notions, as well with regard to the number of ſpeakers, as to their poſitions and the direction of their voices †."

152
How explained.

Various explanations of this peculiar modification of voice have been given. From the report of Fitz-James himſelf, it appeared to Mr Nicholſon, that by long practice he had acquired the faculty of ſpeaking during the inſpiration of the breath, with nearly the ſame articulation, though not ſo loud, nor ſo variouſly modulated, as the ordinary voice, formed by expiration of the air. M. Richerand, who heard Fitz-James at Paris, gives a different account of the matter. He ſays that every time the ventriloquiſt exerted this unuſual peculiarity, he ſuffered diſtention in the epigaſtric region ; that ſometimes he perceived the wind rolling even lower, and that he could not long continue the exertion without fatigue. Richerand believes that the whole mechaniſm of this art conſiſts in a ſlow, gradual expiration, drawn in ſuch a way, that the artiſt either makes uſe of the influence exerted by volition over the muſcles of the parietes of the thorax, or that he keeps the epiglottis down by the baſe of the tongue, the apex of which is not carried beyond the dental arches.

He always made a ſtrong inſpiration juſt before this long expiration, and thus conveyed into the lungs a conſiderable maſs of air, the exit of which he afterwards managed with ſuch addreſs. Therefore repletion of the ſtomach greatly incommoded the talent of M. Fitz-James, by preventing the diaphragm from deſcending ſufficiently to admit of a dilatation of the thorax, in proportion to the quantity of air that the lungs ſhould receive. By accelerating or retarding the exit of the air, he can imitate different voices, and induce his auditors to a belief, that the interlocutors of a dialogue kept up by himſelf alone, are placed at different diſtances ‡.

Mr Gough in an ingenious paper, containing an inveſtigation of the method whereby men judge, by the ear, of the poſition of ſonorous bodies, relative to their own perſons, explains the phenomena of *ventriloquiſm*, on the principles of reverberated ſound, and conſiders it as conſiſting in the talent of making the voice iſſue only from the mouth ; whereas he thinks that in ordinary caſes the different vibrations which are excited by the joint functions of the ſeveral vocal organs in action, paſs along the bones and cartilages from the parts in motion, to the external teguments of the head, face, neck, and cheſt, from which a ſucceſſion of ſimilar vibrations is imparted to the contiguous air, thereby converting the upper half of the ſpeaker's body into an extenſive ſeat of ſound. He thinks that the ſounds proceeding from the mouth of a ventriloquiſt are directed in ſuch a direction that the tones may receive the impreſſion of ſome echo with much more force than they can receive the original ſounds*. It may be doubted whether ſuch echoes can take place in an ordinary room filled with a large audience; and on the whole we are inclined to conſider this phenomenon as being effected partly by the gradual emiſſion and a ſkilful management of a large quantity of air taken in by a full inſpiration, and partly by the influence which the performer is capable of exerciſing over the imagination of his hearers.

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† *Philoſ. Jour.* 8vo. vol. iv. p. 203.

‡ *Richerand's Phyſiol. by Kerriſon*, p. 370.

253 Voice of brutes.

Several of the mammalia have a characteriſtic voice, which is formed by particular organs. There are in ſome animals tenſe membranes; in others peculiar cavities opening into the larynx, and ſometimes appearing like continuations of the laryngeal ventricles. Thus the neighing of the horſe is effected by a delicate, and nearly falciform, membrane, which is attached by its middle to the thyroid cartilage, and has its extremities running along the outer margins of the opening of the glottis. The braying of the aſs is produced by means of a ſimilar membrane, under which there is an excavation in the thyroid cartilage. In this animal there are alſo two large membranous ſacs opening into the larynx. The purring of the cat ſeems to be owing to two delicate membranes that lie below the ligaments of the glottis. Some of the monkey tribe, eſpecially the *ſimia ſeniculus* and beelzebul, have the middle and fore part of the *os hyoides* formed into a ſpherical bony cavity, by which theſe animals are enabled to produce thoſe horrible and penetrating tones, which can be heard at vaſt diſtances, and have gained them the name of howling monkeys †. See Mammalia, N° 33.

254 Voice of birds.

The ſimpleſt vocal organ ſeems to be that of birds. Theſe animals have, on the ſides of the windpipe next the lungs, and at the opening of the bronchiæ, two membranous folds which partly cloſe the pulmonary aperture of the windpipe, and the aperture next the head is ſuſceptible of great contraction and dilatation. In ſhort, the vocal organ of birds may be conſidered as one of the moſt perfect wind inſtruments, very much reſembling, both in its ſtructure and effect, a clarinet or hautboy, the opening next the lungs being ſimilar to the reed of theſe inſtruments. For ſome remarks on the ſong of birds, ſee Ornithology, N° 42; and for farther obſervations on the voice, ſee Anatomy, Part I. N° 122.

255 Relations of reſpiration with other functions.

In tracing the relations of reſpiration with the preceding functions, we muſt deviate a little from our uſual order, and begin with thoſe between reſpiration and *circulation*, as it ſeems to be through the medium of the circulating ſyſtem that reſpiration principally acts on the other functions. The relations between reſpiration and circulation are the moſt immediate and the moſt obvious.

256 With circulation.

When the *breathing* is moſt free and rapid, the circulation is moſt vigorous and active; while in laborious or interrupted reſpiration, the action of the heart and arteries becomes ſlow, feeble, irregular; and where the lungs are deprived of oxygenous gas, the *arteries* gradually ceaſe to pulſate, and ſoon after the motion of the *heart* ceaſes. If the ſtimulus of oxygen be not too long withheld, ſo that the lungs can again be excited to action, firſt the heart, and then the arteries, gradually renew the exerciſe of their functions, and the circulation proceeds as before. On the application of theſe principles depends the recovery of thoſe apparently dead from aſphyxia, ſuffocation, drowning, &c. When the circulation becomes languid from fatigue, from depreſſing paſſions, or the want of accuſtomed ſtimuli, we feel about the breaſt a peculiar ſenſation, which phyſicians call *anxiety*, and which is relieved by a deep inſpiration; by ſighing, yawning, &c. Violent exertions of the reſpiratory organs, ſuch as laughing, coughing, ſinging, talking unuſually long or loudly, quicken the circulation, ſometimes to an alarming degree, ſo as to occaſion hæmorrhage in ſuch as are prediſpoſed to that affection. Breathing in an atmoſphere that is much rarefied, as on the top of a high mountain, has often the effect of producing plethora and hæmorrhage; though this, perhaps, is imputable rather to a want of the ordinary preſſure on the ſurface of the body.

257 With ſenſation.

When the circulation through the lungs is impeded or obſtructed, a determination of blood takes place to other parts, eſpecially to the head. The effects produced on the brain and other organs of ſenſation, by the breathing of impure air, are dreadful. When the ſame quantity of air is repeatedly reſpired, there is experienced, firſt, great anxiety about the breaſt, and this ſoon becomes intolerable; the face ſwells, becomes livid, or even black, and feels exceſſively hot; ſparks of fire ſeem to dance before the eyes; the ſight becomes depraved; giddineſs, ringing in the ears, and confuſion of thought ſucceed; and if freſh air be not ſoon ſupplied, the ſubject of the experiment loſes both ſenſation and motion, and falls into a ſtate reſembling apoplexy ‡. When rarefied air is breathed, the nervous ſyſtem experiences a kind of excitement; agreeable ſenſations are produced, with a diſpoſition to mirth and cheerfulneſs; but if the perſon continue for ſome time in ſuch a ſituation, an unuſual languor, heavineſs, and diſpoſition to ſleep, come on §. We need not here deſcribe the pleaſurable ſenſations excited by the reſpiration of nitrous oxide, as theſe have been already related under Chemistry, N° 360. The exhilarating effects which a pure and ſerene atmoſphere produce on the general ſyſtem, and the uneaſy ſenſations experienced under a thick and clouded ſky, are partly referable to this head. The nervous ſyſtem alſo acts on the organs of reſpiration. In ſome affections of the brain, reſpiration is much quickened, while in others, eſpecially the comatoſe affections, it is ſlow, laborious, and often attended with that peculiar noiſe called *ſtertor*. It is well known what effect anxiety, eagerneſs, hope, or deſire, have on the reſpiration. According as one or other of theſe paſſions is predominant, the breathing becomes hurried, irregular, or ſuſpended.

258 With motion;

An evident relation takes place between reſpiration and motion. The breathing is quickened by exerciſe; and when there is a conſiderable debility of the muſcular ſyſtem, the ſlighteſt exertion produces hurried reſpiration, panting, &c. In thoſe animals that poſſeſs the greateſt powers of motion, reſpiration is moſt free, and the air moſt extenſively diffuſed over the body. In birds, not only the lungs are very extenſive, but the air is conveyed into the bones of the ſkull, and into the hollows of the larger cylindrical bones; and in inſects which have the moſt rapid motions, the air penetrates to every part of the body. Motion, as well as ſenſation, becomes unuſually free and vigorous in rarefied air, and during the reſpiration of nitrous oxide; while in caſes of impeded or obſtructed reſpiration, the action of the muſcles is languid and feeble. Indeed, if we may implicitly rely on the experiments that have been made on the reſpiration of de-oxygenated gaſes, the muſcular fibres are among the firſt organs that are injured. We are told that by the admiſſion of black blood, or blood that has not undergone the neceſſary changes by healthy reſpiration, the muſcles loſe their power of contraction, and even their irritability.

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* *Manchester Memoirs*, v. part ii. p. 522.

† Blumenbach's *Comp. Anat.* chap. xv.

‡ [illegible] *Eſſay on Apparent Death*.

§ *Voyage dans les Alpes*, [illegible]

259
With digeſtion.

The organs and function of reſpiration ſympathiſe with thoſe of digeſtion. When the former function is moſt free, the latter is generally moſt healthy; the reſpiration of pure or rarefied air, or of the nitrous oxide, is attended with an increaſe of appetite, and of the digeſtive powers, as was experienced by M. Sauſſure while wandering among the Alps, and by Davy while reſpiring the *gas of Paradiſe*. Again, when digeſtion is impaired, or when the ſtomach is overloaded, the breathing is rendered difficult, laborious, or irregular, and in many caſes of affection of the ſtomach, cough is a very common ſymptom. Theſe effects produced on the reſpiratory organs in conſequence of impaired digeſtion, are aſcribable chiefly to the preſſure on the diaphragm by the diſtended ſtomach.

Many other relations might be pointed out between reſpiration and the other functions of the animal economy, but our limits do not permit us to enlarge further on the ſubject *.

For an account of the morbid affections of reſpiration, ſuch as *ſneezing*, *hiccup*, *coughing*, *anxiety*, *dyſpnœa*, or *difficulty of breathing*, ſee the article MEDICINE.

CHAP. IX. *Of Nutrition and Aſſimilation.*

260
Nature of nutrition.

THE function by which the nutritious particles received by a living being are aſſimilated to the nature of that being, or become part of its ſubſtance, is properly called *nutrition*. This is the completion of the proceſs which, in moſt animals, is the combined reſult of ſeveral other operations. Thus, in the ſuperior animals, from man to the molluſca, the whole proceſs of nutrition conſiſts of *digeſtion*, *abſorption*, *circulation*, and *reſpiration*; by the two laſt of which the nouriſhment received is changed into perfect blood, and fitted for the ſupport and renewal of the ſeveral parts of the ſyſtem. From the account of the conſtituent parts of the blood given under CHEMISTRY, N° 2660, it will appear, that this fluid contains within itſelf the principles of which every part of the body is compoſed. Thus it contains *fibrine*, which is the chief principle of the muſcular parts; *phoſphate of lime*, which forms the baſis of the bones; *albumen* and *gelatine*, the chief conſtituents of cartilages, ligaments and tendons, &c. Theſe principles are conveyed by the arterial blood, during its circulation, to thoſe parts of the ſyſtem where they are required, for renewing waſte, or ſupplying deficiencies, and thus they are aſſimilated to the nature of the body.

261
Each aſſimilating organ produces peculiar changes.

The power of aſſimilation, ſo remarkable in living bodies, is not the ſame in every aſſimilating organ; but each has the property of converting the materials it receives (provided they be ſuſceptible of this converſion) into a peculiar ſubſtance. Thus, the ſtomach always converts the food into *chyme*; the inteſtines change it into *chyle*; but if chyle, or what is very ſimilar to it, freſh milk, be received into the ſtomach, this organ exerts on it the uſual change, and does not paſs it forward into the inteſtines unaltered, though we know by experiment, that freſh milk is capable of being taken up unchanged by the abſorbents of the bowels *. Again, blood is always perfected within the circulating veſſels; and if chyle or freſh milk be injected into the arteries, it produces dangerous effects, while the freſh blood of another living animal may be transfuſed into theſe veſſels without injury. In like manner, if a piece of freſh muſcular fleſh be cut from a living animal, and applied to the muſcles of another living animal, alſo newly divided, the two parts unite, and are immediately aſſimilated; and even freſh bone may, in the ſame manner be ingrafted on the living bones of the ſame, or of a different ſpecies of animal †; while ſubſtances that are foreign to the nature of the animal body, when introduced into the blood-veſſels, prove fatal, and when inſerted into a wounded muſcular or bony part, prevent the wound from healing.

262
Aſſimilation a chemical proceſs.

Theſe circumſtances ſhow that aſſimilation is a chemical proceſs, though modified and regulated by the action of the living principle. The chemical nature of aſſimilation is moſt diſtinctly proved by the well-known experiment of colouring the bones of an animal, by feeding it on madder. The particles of the madder, which we know to have a ſtrong affinity for phoſphate of lime, are carried unchanged from the ſtomach into the blood-veſſels, and are thence conveyed, probably in combination with the phoſphate of lime there contained, into the ſubſtance of the bones, where they are depoſited, and remain for a conſiderable time.

263
Nutrition not performed by nerves.

We have conſidered nutrition as performed by the circulating veſſels. It has been ſuppoſed that the nerves are the organs of nutrition; but this ſtrange hypotheſis is completely overturned by an experiment of the ſecond Monro, which proves that the limb of a frog may be preſerved alive and nouriſhed by the blood-veſſels, after its communication with the brain has been cut off by dividing the nerves.

264
Nutrition in inſects and zoophytes.

In inſects and zoophytes, where there are no circulating veſſels, nutrition muſt be a very ſimple operation. According to Cuvier, it is performed by *imbibition*; the pores of the animal's body receiving immediately the nutritious fluids on which it feeds.

265
Aſſimilating power limited.

In plants and animals, the aſſimilating power has always certain limits preſcribed to it; its influence is very generally confined to the ſort of food congenial to the ſpecies, and its ſtrength is varied according to circumſtances, as the age, the habits, and the ſtate of health. Thoſe which are young aſſimilate faſter than thoſe which are old; and one ſpecies, which may partly be owing to the nature of their food, will aſſimilate much faſter than another. Certain worms that feed on animal and vegetable ſubſtances will, in twenty-four hours after their eſcape from the egg, become not only double their former ſize, but will weigh, according to Redi, from 155 to 210 times more than before. Moſt oils are of very difficult aſſimilation; and thoſe which are *volatile* will often reſiſt the long-continued and the varied action of the living organs; will mingle with the parts, and, undecompoſed, communicate their flavour.

Other circumſtances reſpecting nutrition have been noticed in the firſt part of ANATOMY, N° 130; and the chemical doctrine of aſſimilation is more fully conſidered under CHEMISTRY, N° 2576—2571.

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* See Bichat *Recherches Phyſiol. ſur la Vie et la Mort.*

* *Fordyce on Digeſtion*, p. 189.

† *Phil. Mag.* vi. 308.

CHAP. X. *Of Secretion.*

266 Secretion. THAT function by which any organ, or ſet of organs, ſeparates from the general maſs of blood certain principles intended to perform ſome important office in the animal economy, is called *ſecretion*; and the ſubſtances ſo ſeparated, are called *ſecretions*.

267 Organs. The ſecretory organs in the more perfect animals are very numerous, and ſome of them very complex. The moſt ſimple of them ſeem to be the *cellular texture*, and the *mucous membranes*. The next in ſimplicity are the *conglobate glands*, and perhaps the *ſpleen*, while the more complex organs are the *liver*, the *teſticles*, the *atrabiliary capſules*, &c. An account of all theſe organs, as they occur in the human body, has been given in the firſt part of the article ANATOMY; and the correſponding organs of the inferior animals, with others not found in man, are deſcribed by writers on comparative anatomy, eſpecially Cuvier and Blumenbach.

268 Kinds of ſecretion. Secretion appears to be of three kinds: 1. *Tranſudation*, in which the ſecreted matters merely ooze through the pores of the ſecreting organ. This takes place in the loweſt claſſes of animals, as in zoophytes, inſects, and ſome worms, but rarely in the human ſubject. 2. *Exhalation*, in which the ſecreted fluids are poured out into cavities by certain branches of the arteries with open mouths, called *exhalants*. This appears to take place in many organs of the moſt perfect animals, eſpecially from the mucous membranes, the ſynovial glands, &c. 3. *Secretion*, properly ſo called, in which the blood paſſes through glandular bodies, where a part of it is decompoſed, and carried out in another form by particular tubes called *excretory ducts*. This is the caſe with moſt of the ſecreting organs, as the ſalivary glands, the lachrymal glands, the liver, the pancreas, the teſticles, and a few others.

269 Secreted matters. The ſecreted fluids are chiefly the following: *lymph*, *ſerum*, *tears*, *mucus*, *ſaliva*, *pancreatic juice*, *gaſtric juice*, *enteric juice*, *bile*, *ſemen*, *ſynovia*, *fat*, *marrow*, *cerumen* or *ear-wax*, and in the female, *milk*. The other matters ſecreted, which may rather be termed ſolid than fluid, are *albumen*, *gelatine*, *fibrine*, and *phoſphate of lime*. On the nature and properties of all theſe ſubſtances, ſee the article CHEMISTRY, Chap. xix. ſect. 3.

270 General modifications of ſecretion. With reſpect to the ſecretions in general, we may remark, that they are conſiderably influenced by age, ſex, various affections of the mind, and various bodily diſeaſes. They are formed by organs which are ſometimes capable of ſupplying the deficiencies of each other; they are ſubjected to the influence of the atmoſphere, and to the temperaments of the body; they are ſometimes mixed together, and by this combination their nature is changed.

We ſhall now briefly examine the action of three of the ſecreting organs, viz. the *cellular membrane*, the *liver*, and the *ſpleen*.

271 Action of the cellular membrane. From the extenſive diſtribution of the cellular membrane it is reaſonable to conclude, that it is intended to perform ſeveral important offices in the animal economy. One of its moſt obvious uſes is to form a general connecting medium between every part of the ſtructure, while it at the ſame time ſeparates and diſtinguiſhes every organ. From its elaſticity, and the lubricating fluid which it holds within its cells, it facilitates motion, and thus aſſiſts the action of all the muſcular parts and organs. That it is ſuſceptible of great dilatation is proved by the phenomena of anaſarcous dropſy; and the gradual evacuation of the water when anaſarcous limbs are punctured, as well as the paſſage of extraneous bodies below the ſkin from one part to another, ſeem to ſhow that it poſſeſſes conſiderable contractile powers. It is chiefly, however, as a *ſecreting* organ that we are here to conſider the *cellular membrane*; and in this way its function is of the utmoſt importance. The *fatty matter*, that is ſo copious in moſt of the ſuperior animals, is contained within particular cells or *bags* of the cellular membrane, and is found in greateſt quantities below the ſkin, eſpecially on the *ſternal* part of the belly, and about the kidneys. In ſome animals, as the *hog*, the *ſeal*, the *walrus* and the *cetaceous* tribes, it forms a layer ſeveral inches in thickneſs, and in all the water animals above mentioned it is nearly fluid. To theſe animals it not only ſerves the purpoſes of a warm covering by the ſlowneſs with which it conducts heat; but, by diminiſhing their ſpecific gravity, renders their motions on the ſurface of the water much more eaſy and expeditious. One of the moſt important uſes of the fat ſeems to be to ſupply nouriſhment to the body, when the ordinary channel is obſtructed, or the ſyſtem rendered incapable, from torpor or diſeaſe, of receiving food. When fat perſons are attacked by fever, or ſimilar acute diſeaſes, they become emaciated, ſometimes to ſo great a degree as to appear a mere ſkeleton; and thoſe animals who ſleep during winter, though very fat when they retire to their dormitories, are extremely lank and lean when they quit theſe on the return of ſpring. In all theſe caſes the fat alone is abſorbed, and ſupplies the waſte that takes place in the body, and would otherwiſe prove fatal.

On the actions of the cellular membrane, ſee Bichat, *Anatomie Generale*, tom. i.

272 Action of the liver. Some phyſiologiſts have ſuppoſed that the bile ſecreted by the liver is not formed entirely from the blood of the *vena portarum*, but partly from the hepatic artery. Dr Saunders, who has examined the arguments in favour of this ſuppoſition, decides againſt it, and conſiders the uſual opinion of the bile being ſolely ſecreted from the blood of the *vena portarum*, as quite ſatisfactory. It has alſo been ſuppoſed, that the whole of the bile is not ſecreted by the liver, but that the gall bladder has a ſhare in this office, and is not merely a reſervoir, like the urinary bladder. This ſuppoſition is highly improbable, although we think there can be little doubt that the bile undergoes, within the gall bladder, ſome peculiar changes, which render it better fitted for the functions it has to perform. We know that the gall bladder is very muſcular, and that there is an appearance of follicles within it. It is therefore probable that ſome matter is ſecreted from its internal ſurface, which produces a neceſſary change in the bile.

273 Uſes of the bile. The principal uſe of the bile ſeems to be to ſtimulate the inteſtines, and thus keep up their energy and periſtaltic motion, though it is probable that, beſides this office, it performs ſeveral others of importance in the animal economy, ſuch as aſſiſting in the decompoſition of the food, and thus forming chyle; and acting as a

general ſtimulus to the ſyſtem. That it has this laſt effect is probable from the torpor, inactivity, and dejection that attend hypochondriacal and chlorotic affections, in which this ſecretion is defective. Too great a ſecretion, or rather excretion of bile, is attended with violent purging *.

On the nature of the bile, and biliary concretions, ſee Chemistry, N° 2664.

274 [illegible]

Few ſubjects in phyſiology have given riſe to more diſcuſſion, and few have been conſidered with ſo little ſucceſs, as the uſe of the ſpleen in the animal economy. That an organ ſo large, and ſo well ſupplied with blood, muſt be intended for ſome important function, is ſcarcely to be doubted; and yet the inſtances of animals that have lived, ſeemingly with little inconvenience, after the ſpleen had been cut out, ſeem to prove that this organ is not of ſuch great importance as it appears to be. The conjectures reſpecting its uſes are various, and ſome of them not a little ludicrous. Some have ſuppoſed that it acted by its weight and preſſure on the ſtomach, and thus promoted digeſtion at one time, and counteracted hunger at another; ſome, that it was intended to dilute and attenuate the blood; others, to deprive that fluid of its ſuperabundant oil; another party, that it contributed to form the red globules of the blood; and ſome of the older phyſiologiſts ſuppoſed that it ſecreted that fluid to which they gave the name of *black bile*.

275 Opinion of Dumas.

Dumas is of opinion that it is a ſort of ſupplementary organ, both to the liver and the kidneys, ſeparating from the blood part of its ſeroſity, and then delivering it over to the liver in a proper ſtate for the formation of bile; and furniſhing to the kidneys another portion of ſeroſity to form the watery part of the urine*. That at leaſt a part of theſe opinions of Dumas has ſome foundation, will appear from the following ſummary of the late experiments of Mr Everard Home.

276 Experiments of Mr Home.

Proſecuting the inquiry reſpecting the ſtate of the ſtomach during digeſtion, which we have formerly alluded to (ſee N° 161), Mr Home found that during digeſtion, the fluids taken into the ſtomach are principally contained in the cardiac portion; and he inferred, from the uniform conſiſtence of the chyme in the pyloric portion, that a great part of the fluids are carried out of the ſtomach without ever reaching the *pylorus*. As he conceived very naturally, that the lymphatics of the ſtomach were inadequate to this office, he conjectured that the fluids might paſs off by the ſpleen. He proved, by a deciſive experiment, that liquors might paſs through the ſtomach without going through the pylorus, and he alſo found at the ſame time, that the ſpleen was turgid, unuſually large, and its external ſurface very irregular; and when cut into, ſmall cells were every where met with, containing a watery fluid, and occupying a conſiderable portion of its ſubſtance. Rudiments of theſe cells had been ſeen before by Malpighi, who conſidered them to be glands, and by Cuvier, who calls them corpuſcles; but the cells in a diſtended ſtate ſeem not to have been examined till Mr Home was led to look for them, in conſequence of the above experiment. Mr Home varied this experiment, by giving animals a decoction of madder, and an infuſion of rhubarb, and obtained ſimilar reſults. Part of the fluid ſwallowed was again rejected by vomiting; but of that which remained it was always found that a part had eſcaped, without any poſſibility of paſſing by the *pylorus*, as this was ſecured by ligature. It did not probably eſcape by the abſorbents, as theſe were not ſo much diſtended by fluid as to be viſible; and it certainly did enter the ſpleen, as there was there found a quantity of liquor, which was proved, by an alkaline teſt, to contain rhubarb. A large quantity of urine was found in the bladder, alſo impregnated with rhubarb *.

277 Spleen carries off fluid from the ſtomach.

From theſe experiments it appears, that the ſpleen is capable of carrying off from the ſtomach, a part of its fluid contents, thus affording a much nearer paſſage to the bladder than through the abſorbents. If this inveſtigation, on further trials, ſhall prove equally ſatisfactory, it will explain why the bladder is often diſtended with urine in a ſhort time after drinking; and will do away the neceſſity of having recourſe to the diſputed hypotheſis of the retrograde action of the abſorbents.

278 Peculiar animal ſecretions.

In the inferior claſſes of animals there are a number of peculiar ſecretions, which, from their utility in medicine or the arts, or from their noxious or unpleaſant effects, are deſerving the attention of phyſiologiſts. We can here only mention a few of the more important. The nature and properties of moſt of them are explained under Chemistry.

Some of the mammalia ſecrete matters that have a very ſtrong ſmell, as *muſk*, *civet*, *caſtor*, and in particular the fluid emitted from the hide of ſeveral of the weazel tribe, beſide the civet cat. *Ambergris* is ſecreted by ſome ſpecies of whales. Birds, eſpecially water fowls, ſecrete a large quantity of oily matter, which they uſe in dreſſing their feathers. Some reptiles, eſpecially the toad, ſecrete an acrimonious fluid, which ſeems to ſerve them as a weapon of defence. Many ſerpents, as is well known, produce a moſt virulent poiſon, which they inſert into the wounds inflicted by their fangs. Some fiſhes ſecrete fluids of a ſimilar tendency. Few animals, however, form ſecretions ſo various and ſo uſeful, as the inſect tribes, from whom we procure *cochineal*, *kermes*, *lac*, *ſilk*, &c. Some of the mollusca, as the muſcle, and the ſpinning ſlug, alſo ſecrete a matter ſimilar to ſilk, by means of which they either ſecure themſelves firmly in their ſituations, or facilitate their progreſſive motion. The *ink* of the *cuttle fiſh*, ſuppoſed with no ſmall probability, to be the baſis of Indian or Chineſe ink, is alſo a remarkable animal ſecretion, which ſeems intended by nature to ſcreen the animal, and aſſiſt it in eluding the vigilance of its purſuers.

279 Vegetable ſecretions.

There are alſo many important vegetable ſecretions, conſtituting what are called *gums*, *reſins*, and *gum reſins*; as *gum arabic*, *gum-dragant*; *guaiac*, *dragon's blood*; *aſſafoetida*, *gamboge*, *myrrh*, *aloes*, and many others; for an account of which ſee Chemistry and Materia Medica.

CHAP. XI. *Of Excretion.*

280 Excretion.

The function of excretion differs but little in its nature from that of ſecretion already conſidered. As the organs of ſecretion ſeparate from the blood thoſe ſubſtances which are uſeful in the animal economy, ſo the excretory organs ſeparate from the blood, or from the food taken into the ſtomach, thoſe ſubſtances which are to be conveyed out of the body as excrementitious, viz. the ſolid excrement, the urine, and perſpiration.

281 Organs.

The organs of excretion, then, are chiefly the bowels, eſpecially the larger inteſtines, the kidneys, with their

appendages,

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* [illegible]

* *Principes de Phyſiol.* tom. iii p. 592.

* *Phil. Tranſ.* for 1808, p. 2.

[illegible] the ureters and [illegible] bladder, and the [illegible]. For an account of theſe in the human body, ſee [illegible]; and for the varieties of theſe organs [illegible] them, and [illegible] quoted.

252 [illegible] The [illegible] carried onward through the colon and rectum by the pe-[illegible] by the ſtimulus of their contents, and of the bile, and aſſiſted by the preſſure of the abdominal muſcles, till they reach the extremity of the rectum, when becoming more ſtimulant, partly by their bulk, and partly by their increaſed acrimony, they rouſe the muſcular fibres of that inteſtine to greater action, ſo as, with the aſſiſtance of the abdominal muſcles, to overcome the reſiſtance of the [illegible].

253 Relations. Inteſtinal excretion is influenced by moſt of the preceding [illegible]. 1. By the [illegible] that in caſes of paralyſis, the excrements are not paſſed without artificial means, or they are voided involuntarily. 2. By motion. Thus we find that the action of the bowels is increaſed by exerciſe, and leſſened by indolence [illegible] excrement paſſed is greater in the latter caſe than in the former, ſhewing that the ſtimulus of the excrementitious matter is not ſufficient without muſcular action, to produce the regular performance of this function. 3. By digeſtion. It is well known that the ſtronger the digeſtive powers of the ſtomach, the more active are the bowels, and again, when theſe latter are overloaded with excrement, the functions of the ſtomach are diſordered. 4. By ſecretion. The action of the inteſtines is increaſed, when that of the ſecretory organs which pour their contents into the alimentary canal, becomes unuſually great, viz. in unuſual ſecretions of bile or mucus, as in *cholera* and *diarrhœa*; while, when thoſe ſecretions are [illegible] unuſually torpid.

The morbid affections of inteſtinal ſecretion have been [illegible] N° 109—112. and 114, 115.

254 [illegible] by the kidneys. The organs deſtined for the excretion of urine afford the moſt complete apparatus for this function of any that we ſhall have occaſion to notice, conſiſting of an aſſemblage of glands, collected within one membrane; an excretory duct; a reſervoir for collecting the excreted fluid, and a canal for conveying it out of the body. Indeed we may conſider the kidneys rather as ſecreting than excreting organs, as the urine there formed differs [illegible] in its nature and properties from the [illegible] fluids. We know, by a deciſive experiment, that the kidneys perform the whole of this office, and that the other organs are intended for the excretion of the urine; for when the ureters are tied or obſtructed next the bladder, we find that the ſecretion of urine ſtill goes on, and that the ureters above the obſtruction ſoon become filled and [illegible] diſtended.

The nature and properties of urine, in its natural ſtate, and as altered in certain diſeaſes, have been conſidered under CHEMISTRY, N° [illegible].

As the urine contains two ſubſtances that are not found in the blood, [illegible] Dr Thom-[illegible] [illegible]

[illegible] And in caſes of palſy, an incontinence, or a total ſup-[illegible] thoſe who uſe much exerciſe, or lead a laborious life.

The morbid affections referable to this excretion, are [illegible].

256 [illegible] by the ſkin. The [illegible] exerciſed the ingenuity of many phyſicians and phyſiologiſts, [illegible] in the beginning of the 18th century, is certainly of great importance. The quantity of watery fluid occaſionally thrown out by the ſkin in the form of ſweat, [illegible] from a great deal of uſeleſs or perhaps injurious matter, [illegible] pelled by other outlets. The nature of the matter perſpired, and the quantity of ordinary perſpiration, have been inveſtigated by many able experimentaliſts, the reſult of whoſe labours is given in the firſt volume of Johnſon's *Animal Chemiſtry*; the fifth volume (third edition) of Dr Thomſon's *Syſtem of Chemiſtry*; in a paper by Dr Kellie in the ſecond number of the *Edinburgh Medical and* [illegible] CHEMISTRY.

The principal facts that have been aſcertained with reſpect to the perſpirable matter thrown out by the ſkin, relate either to its quantity, or its chemical compoſition.

257 Quantity of [illegible]ration. I. The experiments on the quantity perſpired, on [illegible] guin, and Mr Abernethy. From theſe experiments we may deduce the following concluſions: 1. The greateſt quantity of matter perſpired in a minute, amounts to about 26 grains troy, the leaſt to about 9 grains; giving an average of about 17 grains in the minute, or about 52 ounces in 24 hours. Dr Kellie eſtimates the quantity at about 30 ounces, which ſeems too ſmall. 2. The quantity of perſpiration is increaſed by drink, but not perceptibly by ſolid food. 3. Perſpiration is the leaſt in quantity immediately after a meal, and reaches its higheſt proportion during digeſtion.

258 [illegible] II. The [illegible] a ſmall quantity of another acid, ſuppoſed to be the phoſphoric, and a peculiar oily matter of an odorous quality, differing in different animals, and, as it ſhould ſeem, [illegible] CHEMISTRY, N° [illegible].

[illegible] As to the [illegible]

it is leſſened by inactivity; by the impaired ſtate of the digeſtive organs; by languid circulation and reſpiration, and by violent purging, or evacuation of urine.

Chap. XII. *Of Integumation.*

290
Uſes of integuments as defence.

All living bodies are furniſhed with integuments, which are intended to afford them a defence againſt thoſe injuries to which their ſituation is commonly expoſed. Of the integuments ſome are uſeful in preventing the diſſipation of the fluids; ſome in reſiſting acrid and corroſive ſubſtances; ſome of them are indigeſtible in the ſtomach of animals, and ſome appear to be incorruptible in the earth. By theſe properties, ſeeds and the ova of inſects are preſerved for a conſiderable time, waiting the changes of ſoil or of ſeaſon that are favourable to their evolution. They are protected from the action of weak membranous ſtomachs, and thus the animals who may ſwallow them contribute to their propagation. It is thus the ſeeds of the miſletoe are diſperſed, and depoſited on the bark of the oak or the aſh. There is a gelatinous ſubſtance frequently ejected by birds, and commonly called *tremella*, *noſtoc*, or ſtar-fall, which Dr Barclay has proved to be nothing elſe than the oviducts of frogs, which, as the embryo in form of an egg, moves along their winding canal, ſecrete that tranſparent and viſcid matter which conſtitutes the albuminous part of the ovum, and feeds and protects the embryo while in water.

The moſt important circumſtances with reſpect to integumation relate to the varieties of the integuments themſelves, and to the changes or renovation of theſe in different animals.

291
Integuments uſeful by their hardneſs;

I. Some integuments are uſeful, chiefly from their ſtrength and hardneſs. The *elytra* or ſhelly coverings of the beetle tribes afford an excellent defence for their membranous wings, when folded up; the ſhell of the ſnail lodges the inteſtines, when the animal comes forth to ſearch for food, and affords a ſafe retreat to the animal, when it is threatened with any danger from without. The ſhells of ſome animals can be opened and cloſed by a muſcular power; and ſome of them, as in the tail of the lobſter, are ſo diſpoſed in plates or ſcales, as to be no hindrance to the animal's motion. Several inſects which paſs a part of their time in the water, always compoſe for themſelves a ſhell, where it is needful.

292
by their external covering;

Some integuments are covered with feathers, ſome with hair or thick down. Beſides many other obvious uſes of theſe coverings, they generally ſerve to repel inſects; and being bad conductors of heat, tend to preſerve an equal and neceſſary temperature. Some integuments are covered with prickles, which oppoſe the attacks of an enemy by the ſtrength of their points, or by the venom which they infuſe, as in the ſtings of nettles, and the down of ſome other plants, and ſome inſects. Others again are moiſtened by a viſcid ſecretion, which preſerves the neceſſary ſoftneſs of the parts, prevents evaporation, reſiſts acrimony, enables ſome beings to deſtroy their enemies, and aſſiſts others in performing their progreſſive motions.

293
by their effluvia;

Both plants and animals, but particularly the former, are often protected by odorous effluvia from their integuments. Theſe effluvia are the finer parts of their volatile oil, always inflammable, and ſo ſubtile, that the continual emiſſion of it from wood or flowers does not ſenſibly diminiſh their weight. To this fragrance it is owing, that the deadly nightſhade (*atropa belladonna*), the henbane, hounds-tongue, and many others, are ſeen on almoſt every high road untouched by animals. The manchinelle-tree of the Weſt Indies emits ſo very dangerous vapours, that the natives poiſon their arrows with its juices, and thoſe have died who have ventured to ſleep under its ſhade. The *lobelia longiflora* of America produces a ſuffocating oppreſſion in the breaſt of thoſe who reſpire in its vicinity. The return of a periodical diſorder has been attributed to the exhalation of the *rhus toxicodendron*. Of all the vegetable effluvia, however, that afford defence to the plant from which they proceed, or annoyance to the animals that approach it, none are equal to thoſe of the celebrated *bohun-upas*, or poiſon-tree of Java, whoſe exhalations have been ſaid to extend to the diſtance of ſeveral miles, preventing all acceſs of animals, or puniſhing the intruders with certain death. It is rather unfortunate for the botanical poets, that the effects of this poiſon have been greatly exaggerated, if indeed ſuch a marvellous tree really exiſts *.

294
by their colour.

Various colours of the integuments afford a ſpecies of defence. Caterpillars which feed on leaves are generally green; and earth worms the colour of the earth which they inhabit. Butterflies which frequent flowers are coloured like them. Small birds which frequent hedges have greeniſh backs like the leaves, and light-coloured bellies like the ſky, and are hence leſs viſible to the hawk who paſſes under them or over them. Thoſe birds which are much amongſt flowers, as the goldfinch, are furniſhed with vivid colours. The lark, partridge, and hare, are of the colour of dry vegetables, or earth on which they reſt; and frogs vary their colour with the mud of the ſtreams which they frequent, and thoſe which live on trees are green. Fiſh which are generally ſuſpended in the water, and ſwallows which are generally ſuſpended in the air, have their backs the colour of the diſtant ground, and their bellies of the ſky. The *ſphinx convolvuli*, or unicorn moth, reſembles in colour the flower on which it reſts; and among plants, the nectary and petals of the *ophrys*, and of ſome kinds of the *delphinium*, reſemble both in form and colour the inſects which plunder them, and thus ſometimes eſcape from their enemies by having the appearance of being pre-occupied. From colour being thus employed as a defence, many animals vary their colours with the ſeaſons and circumſtances; and thoſe which are of different colours in ſummer according to the places which they inhabit, in winter aſſume in common the colour of the ſnow.

295
Change of integuments.

II. The changes that take place on the integuments conſiſt either of a partial, or complete, renewal of them. As the more ſuperficial integuments are commonly inſenſible to ſtimuli, and poſſeſs little or nothing of the vital principle; in all caſes where they cannot be enlarged to admit of an additional increaſe of growth, or, where they are not furniſhed with organs for repairing thoſe injuries which they may ſuffer from accident or diſeaſe, the body is endowed by nature with a power of throwing them off, and of producing others in their ſtead. Thus, ſerpents and toads ſlough their ſkins; the cruſtacea caſt their ſhells; the larvæ of inſects change their cuticle; and ſeveral trees, eſpecially the

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* See *Pinkerton's Geography*, under *Java*.

Of Transformation.

the cork tree, throw off their outer bark. Even man himſelf generally changes the cuticle, which peels off in the form of ſcales. Moſt animals once a year change their hair, wool, or feathers, and have theſe renewed by a freſh covering; a proceſs well known by the name of *moulting*. Some animals who do not uſually caſt their external covering, have the power of repairing this when injured. This is the caſe with moſt of the teſtacea, eſpecially ſnails.

Chap. XIII. *Of Transformation.*

296 Transformation.

The alterations which organized beings undergo from *metamorphoſis* or transformation, are more ſtriking than thoſe which we have deſcribed in the preceding chapter. It has indeed been aſſerted, that theſe alterations conſiſt in throwing off certain temporary coverings; but this expreſſion is inaccurate, and ariſes from a want of preciſion of ideas. Transformation and change of integuments are really different; the truth is, transformation often takes place without any change of integuments, and there is often a change of integuments without any change of form. This new form is ſometimes occaſioned by a change of ſhape, conſiſtency, and colour, as when the lobes of a ſeed are converted into ſeminal leaves. It is at other times occaſioned by a change of proportion among the parts, and at others by the addition of new organs, as when the emmet receives wings, and the plume of the ſeed is fed by new roots ſtriking into the ground: or, laſtly, it is occaſioned by a change in the form and organs, and in their mode of operation, as happens in a remarkable degree to ſome inſects. Indeed, though all living bodies, both plants and animals, undergo ſome degree of transformation in the courſe of their exiſtence, theſe changes are moſt remarkable in inſects.

297 Transformation of reptiles;

Many reptiles undergo very curious changes, but theſe are moſt remarkable in the frog tribe. The larva or tadpole, as it is called, of the frog, is an animal with a large head, a long tail, no limbs, and commonly poſſeſſed of gills, all obviouſly very different, both in form, proportion, and uſes, from the parts of the perfect animal. The curious appearance of what has been conſidered as the tadpole of the *rana paradoxa*, has led ſome naturaliſts to deſcribe it as an animal of a different genus, either a fiſh or a lizard; ſee Erpetology, p. 284.

298 of inſects.

Many inſects appear to conſiſt of two diſtinct animal bodies, one within the other; the exterior, a creature of an ugly form, reſiding in the water, or under the earth, breathing by gills, or ſometimes by tracheæ projecting from the tail, poſſeſſing a voracious and grovelling appetite, and having a ſyſtem of ſanguiferous veſſels that circulates the blood towards the head. When all its parts decay and fall off, the creature incloſed ſucceeds in its ſtead: this often is an animal of a different form, generally lives in a different element, feeds on a different ſpecies of food, has different inſtruments of motion, different organs of ſenſe, different organs of reſpiration and differently ſituated; and being endowed with the parts of generation, inclines to gratify the ſenſual propenſity, and produces an embryo, which becomes like the firſt, and from which, in proceſs of time, a creature is evolved ſimilar to the former.

If the embryo or egg be depoſited on a leaf, the leaf is frequently obſerved to bend, to wrap it in folds, intended for the purpoſe of protecting it from injuries and danger. If depoſited in the body of an animal or plant, they accommodate themſelves to its wants and neceſſities, and furniſh a tumor which ſerves it for a nidus, and beſides, like an uterus, ſupplies it with nouriſhment: and if depoſited in the body of an inſect, the creature provides for the future deſtination of its young charge with all the tender care of a parent, and then dies.

299 Parents of inſects often not eaſily diſtinguiſhed.

Theſe circumſtances, added to the great variety of forms which inſects aſſume, render it ſometimes difficult to know who is the parent. We cannot, for inſtance, pronounce with certainty who is the true parent of the gordius, known by the name of the *ſeta equina*, or hair eel. A ſet of experiments which Dr Barclay once began with a view to throw ſome light on the ſubject, were unfortunately interrupted by an accident. He learned only, from a number of obſervations, that certain black beetles, at the end of ſummer, have the ſtrongeſt propenſity to run into the water, where they ſoon die; and that one or two, and ſometimes three or four of thoſe eels gradually drop from the beetle by the anus. Whether other inſects provide for the gordius in this manner, we have not yet been able to determine.

300 Transformation accompanied by a change of propenſities.

In all living bodies poſſeſſed of a *ſenſorium*, the changes of form, as well as the changes of habit and of age, are uſually accompanied with new propenſities, appetites, and paſſions.

301 Conſiſts in the evolution of parts

Microſcopic obſervations having demonſtrated, that all the forms of the plant and animal exiſted previouſly in the ſeed or embryo; transformation muſt be owing entirely to the evolution of the different parts by means of nutrition.

302 Its uſes.

What nature intends by transformation, we cannot determine; but by means of it different elements are peopled, the different ſeaſons variouſly adorned, and animated nature wonderfully diverſified without a multiplication of beings.

Chap. XIV. *Of Reproduction.*

303 Reproduction of parts.

In the preſent chapter we ſhall notice, firſt, the partial reproductions that take place in ſome claſſes of animals, and then take a general comparative view of the principal phenomena of generation, in the various claſſes of living beings.

304 In the *mammalia.*

Experiments have proved, that even in the ſuperior claſſes of animals, many parts of the body, when deſtroyed or removed, may be reproduced. A bone may be broken in ſuch a manner, that part of it muſt be taken away, but in a few weeks the ſeparated ends are brought together by the formation of new bony matter, called *callus*. Little more than 24 hours have elapſed after a fracture, before nature begins her operations. The ſoft parts inflame; the perioſteum becomes ſwelled; the veſſels pour out coagulable lymph, and a [illegible], gelatinous ſubſtance appears about the broken extremities of the bone. Into this minute blood-veſſels are gradually ſent off from the arteries, and in no very long time phoſphate of lime begins to be ſecreted, for rendering the whole firm and compact. In caſes of *necroſis*, where the old bone entirely loſes its vitality, new bone is ſecreted into the ſurrounding perioſteum, which thickens and enlarges, and in time ſupplies the place of the old bone. When a muſcular part is cut away, as in removing [illegible]

Of Repro-duction.

that has become gangrenous, if the healthy function of the surrounding parts can be restored, and the loss of flesh has not been too great, the wound gradually fills up, not indeed with fleshy fibres, but with granulations very much resembling the ordinary cellular ſubſtance. It is well known, that the hair, nails, and ſkin, are occaſionally renewed; but it will appear extraordinary that blood-veſſels, and even nerves, have been reproduced. In caſes of aneuriſm, where the trunk of the diſeaſed artery is divided, ſo as to cut off the uſual channel for the blood, the anaſtomoſing branches become gradually enlarged, and even new branches appear to be formed for carrying on the circulation. What has been ſaid above reſpecting the formation of *callus*, alſo proves the formation of new blood-veſſels; and the obſervations of Mr John Hunter put this beyond a doubt. Till within theſe few years, it was thought impoſſible that a divided nerve ſhould re-unite; but ſome late experiments of Mr Cruikſhank have proved that this re-union may take place *.

* *Phil. Trans.* 1795, p. 177.

Under this head we may mention ſome curious experiments that have been lately made by Dr Jones, on the means by which nature ſuppreſſes the hæmorrhage from divided arteries. Theſe experiments were made on dogs, and the reſults of them lead us to conclude, that the following is nearly the proceſs by which the hæmorrhage is ſuppreſſed. Firſt, the divided artery contracts, and is drawn within the neighbouring parts; blood is gradually effuſed into the ſheath of the artery and the adjoining cellular ſubſtance, where it is entangled, and affords a baſis for the formation of a coagulum or clot, which ſurrounds the extremity of the divided artery, and prevents the farther effuſion of blood, till another clot is formed within the mouth of the artery, plugging it completely up. Soon after there oozes out between the external and internal clot, a quantity of coagulable lymph, which cements all the parts together, and thus in time, if the artery divided be not very large, and the force of the circulation very great, the cavity of the veſſel and the divided extremity, is obliterated, and all further loſs of blood effectually prevented †.

† *Jones's Treatiſe on Hæmorrhages*, &c.

305 Reproduction of parts, in the inferior animals;

It is, however, in the lower claſſes that we are to look for the moſt remarkable inſtances of this proviſion of nature, particularly among the reptiles, cruſtacea, molluſca, worms, and polypes.

306 in reptiles;

In many reptiles, the legs and tail, when cut off, are ſoon renewed, and even the eyes have been re-produced. Some intereſting experiments on this ſubject by Spallanzani have been related under ERPETOLOGY, p. 316, to which we refer the reader.

307 in cruſtacea;

In the cruſtacea, the legs and claws are very often torn away, either by accident, or by ſome voracious animal; but theſe never fail to be renewed in a ſhort time, provided the animal is in good health. This is moſt remarkable in the craw-fiſh (cancer aſtacus, Lin.). It has been obſerved that when the claw of this animal is broken, the moſt diſtant part is gradually caſt off, and about a day or two after, a red membrane, not unlike a bit of red cloth cloſes up the aperture. This is at firſt plain; but in the courſe of four or five days it aſſumes a convexity, which gradually augments till it takes the appearance of a ſmall cone, which exceeds not a line in height. It continues, however, to ſtretch out, and in ten days it is ſometimes more than three lines, or about one-fourth of an inch high. It is not hollow, but filled with fleſh, and this fleſh is the baſis or rudiment of a new claw. The membrane that covers the fleſh performs the ſame office to the young claw as the membranes do to the fœtus of the larger animals. It extends in proportion as the animal grows; and as it is pretty thick, we can perceive nothing but a lengthened cone. When 15 days are elapſed, this cone inclines towards the head of the animal. In a few days more its curvature increaſes, and it begins to aſſume the appearance of a dead claw. This claw, though at the end of a month or five weeks it has acquired the length of ſix or ſeven lines, which is more than half an inch, is ſtill incapable of action. The membrane in which it is encloſed becoming gradually thinner, in proportion as it extends, gives an opportunity of obſerving the parts of the claw, and we now perceive that this conical ſubſtance is not a ſimple congeries of fleſh. The moment is now arrived when the claw begins to be brought forth. The membrane at laſt burſts, and the new claw, though ſtill ſoft, appears without incumbrance or inveſtment. In a few days more it is covered with a ſhell; and though ſtill delicate, and not the half of its former length, it is able to perform all the natural functions. It has likewiſe been diſcovered, that, whether the claw has been lopped off at the fourth articulation, or anywhere elſe, the animal in a ſhort time recovers all that it had loſt. The ſame reproduction takes place alſo in the horns; but, if the tail is cut off, the animal ſurvives a few days only *.

* *Bingley's Animal Biog.* vol. iii.

308 in molluſca;

Many of the molluſca exhibit curious inſtances of reproduction, eſpecially the actinia, the ſtar-fiſh, and ſnails. The Abbé Dicquemaire made ſeveral experiments to aſcertain the reproductive power of the *actinia rufa* (purple ſea anemony). He firſt cut off all its tentacula, which grew again in leſs than a month; and on repeating this a ſecond and third time, he had equal ſucceſs. He cut off the upper part of one, and a few days after, the baſe of the animal was found to have fallen from its place; but it ſoon entirely recovered its limbs. But if the baſe of theſe animals is injured by the inciſion, the wound commonly proves mortal. The arms of the ſtar-fiſh are often torn off, but appear always to be reproduced. The power of ſnails in this reſpect is very great; for Spallanzani has aſcertained, that even if their heads are cut off, theſe are regenerated in no very long time. There can ſcarcely be a more ſurpriſing inſtance of animal reproduction than this, as we ſhall readily allow, if we conſider the complicated ſtructure of the head of a ſnail; that it contains a brain divided into two parts; that the horns attached to it are furniſhed with muſcles, and that on the tops of the larger horns there are eyes, compoſed of two coats and three humours; that the head contains a mouth, lips, teeth, and a palate; and yet all theſe parts, when cut away, have been reproduced in the courſe of a few weeks.

309 in polypes.

On the reproductive power of polypes we have been ſufficiently minute under HELMINTHOLOGY, N° 84.

310 Writers on the re-production of parts.

As this ſubject of partial reproduction is extremely curious, and as we cannot here enter upon any particular detail on the experiments and obſervations that have been made on the ſubject, we ſhall conclude this part of the preſent chapter by enumerating the principal works to which the reader may refer for a more ſatiſfactory account of the ſubject. Theſe are chiefly Trembley,

bley, *Memoires ſur les Polypes*; Bonnet, *Traité d'Inſectologie*, *Palingeneſie*, and *Conſiderations ſur les Corps Organiſés*, vol. ii.; Reaumur, *ſur les Inſects*; Spallanzani, *Tracts on Animals and Vegetables*, and *Eſſay on Reproduction*; Hunter's *Treatiſe on the Blood*, &c.; Ruſſel's *Practical Eſſay on Necroſis* Moore *on the Healing Proceſs*; Murray, *de Redintegratione Partium*; and the publications of Dr Jones and Mr Cruikſhank already referred to. There is alſo a neat view of the principal facts relating to this ſubject in a theſis *De Vulnere Naturæ Sanándo*, publiſhed at Edinburgh in 1805, by Dr John Gordon.

311
Reproduction of the ſpecies by generation.

We have already ſtated it as our opinion, that plants, as well as animals, reproduce their like by generation. We ſhall not now enter on a diſcuſſion of the controverted point of the ſexual ſyſtem; and as the parts that appear ſubſervient to this function in plants, and their various modes of propagation, have been ſufficiently explained under the articles BOTANY and PLANT, we ſhall in this chapter confine our attention to the generation of animals.

312
Organs.

The human organs of generation are deſcribed in the article ANATOMY, ſect. xv. thoſe of the cetacea under CETOLOGY, N° 161.; thoſe of birds under *Comparative* ANATOMY, 277: thoſe of fiſhes have been noticed under ICHTHYOLOGY. For a more full comparative view of theſe organs, we refer to Cuvier and Blumenbach.

313
Nature of generation.

The nature of generation which is the greateſt myſtery in the economy of living bodies, is ſtill involved in impenetrable obſcurity. The only circumſtance common to all generation, and conſequently the only eſſential part of the proceſs, is, that every living body is attached at firſt to a larger body of the ſame ſpecies with itſelf. It conſtitutes a part of this larger body, and derives nouriſhment, for a certain time, from its juices. The ſubſequent ſeparation conſtitutes *birth*, and may be the ſimple reſult of the life of the larger body, and of the conſequent developement of the ſmaller, without the addition of any occaſional action.

Thus the eſſence of generation conſiſts in the appearance of a ſmall organized body in or upon ſome part of a larger one; from which it is ſeparated at a certain period, in order to aſſume an independent exiſtence.

All the proceſſes and organs, which co-operate in the buſineſs of generation in certain claſſes, are only acceſſory to this primary function.

314
Gemmiparous generation.

When the function is thus reduced to the moſt ſimple ſtate, it conſtitutes the gemmiparous, or generation by ſhoots. In this way the buds of trees are developed into branches, from which other trees may be formed. The polypes (hydra) ſee HELMINTHOLOGY, N° 84. and the ſea anemones (actiniæ), multiply in this manner; ſome worms are propagated by a diviſion of their body, and muſt, therefore, be arranged in the ſame diviſion. This mode of generation requires no diſtinction of ſex, no copulation, nor any particular organ.

315
Fecundation.

Other modes of generation are accompliſhed in appropriate organs; the germs appear in a definite ſituation in the body, and the aſſiſtance of certain operations is required for their further developement. Theſe operations conſtitute *fecundation*, and ſuppoſe the exiſtence of *ſexual parts*; which may either be ſeparate, or united in the ſame individual.

In moſt animals the embryo of the future young is fecundated within the peculiar organs of one individual, while another of the ſame ſpecies is provided with the means of giving activity to the embryo by a fecundating fluid. In ſome animals, however, both theſe offices are performed by the ſame individual, which is then ſaid to be androgynous, or hermaphrodite.

316
Diſtinction of ſexes.

The office of the male ſex is that of furniſhing the *fecundating* or *ſeminal fluid*; but the manner in which that contributes to the developement of the germ is not yet ſettled by phyſiologiſts. In ſeveral inſtances, particularly in the frog, the germ may be clearly recognized in the ovum before fecundation; its pre-exiſtence may be inferred in other caſes from the manner in which it is connected to the ovum when it firſt becomes viſible; for it is agreed on all hands, that the ovum exiſts in the female before fecundation, ſince virgin hens lay eggs, &c.

317
Hermaphrodites.

The combination of the ſexes and the mode of fecundation are ſubject to great variety. In ſome inſtances they are united in the ſame individual, and the animal impregnates itſelf. The acephalous molluſca and the echini exemplify this ſtructure. In others, although the ſexes are united in each individual, an act of copulation is required, in which they both fecundate, and are fecundated; this is the caſe with the gaſteropodous molluſca and ſeveral worms. In the remainder of the animal kingdom the ſexes belong to different individuals.

318
Modes of impregnation.

The fecundating liquor is always applied upon or about the germs. In many caſes the ova are extruded before they are touched by the ſemen, as in ſome bony fiſhes and the cephalopodous molluſca. Here, therefore, impregnation is effected out of the body, as it is alſo in the frog and toad. But in the latter inſtances the male embraces the female, and diſcharges his ſemen in proportion as ſhe voids the eggs. In moſt animals the ſeminal liquor is introduced into the body of the female, and the ova are fecundated before they are diſcharged. This is the caſe in the mammalia, birds, moſt reptiles, and ſome fiſhes; in the hermaphrodite gaſteropodous molluſca, in the cruſtacea, and inſects. In all the latt mentioned orders ova may be diſcharged without previous copulation, as in the preceding. But they receive no further developement; nor can they be fecundated when voided *. We ſhall not gratify the prurient imagination of the philoſophic ſenſualiſt, by any details of the mode in which theſe operations are carried on in the various claſſes of animals, except in one inſtance, which is ſo curious that we ſhall be excuſed for deſcribing it. We allude to the copulation of the ſnail.

319
Copulation of ſnails.

Theſe animals meet in pairs, and ſtationing themſelves an inch or two apart, launch ſeveral little darts, not quite half an inch long, at each other. Theſe are of a horny ſubſtance, and ſharply pointed at one end. The animals, during the breeding ſeaſon, are provided with a little reſervoir for them, ſituated within the neck, and opening on the right ſide. On the diſcharge of the firſt dart, the wounded ſnail immediately retaliates on its aggreſſor by ejecting at it a ſimilar dart, the other again renews the battle, and in turn is again wounded. Thus are the darts of Cupid, metaphorical with all the reſt of the creation, completely realiſed in ſnails. After the combat they come together. Each of them lays its eggs in ſome ſheltered and moiſt ſitu-

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* Cuvier Leçons d'Anat. Comp. tom. v. p. 12.

Of Reproduction.

tion, generally under a little clod of earth, or in ſome cool cavity †.

† [illegible] vol. i.

320 The effect of a ſingle copulation varies in its degree: it uſually fecundates one generation only; but ſometimes, as in poultry, ſeveral eggs are fecundated; ſtill, however, they only form one generation. In a very few inſtances one act of copulation fecundates ſeveral generations, which can propagate their ſpecies without the aid of the male. In the plant-louſe (*aphis*) this has been repeated eight times; and in ſome *monoculi* 12 or 15 times.

321 Oviparous generation. When the germ is detached from the ovary, its mode of exiſtence may be more or leſs complete. In moſt animals it is connected, by means of veſſels, to an organized maſs, and the abſorption of which nouriſhes and developes it until the period of its birth. It derives nothing, therefore, from the body of the mother, from which it is ſeparated by coverings varying in number and ſolidity. The germ, together with its maſs of nouriſhment, and the ſurrounding membranes, conſtitutes an egg, or *ovum;* and the animals which produce their young in this ſtate, are denominated *oviparous.*

In moſt of theſe the germ contained in the egg is not developed until that part has quitted the body of the mother, or has been *laid;* whether it be neceſſary that it ſhould be afterwards fecundated, as in many fiſhes; or require only the application of artificial heat for its incubation, as in birds; or that the natural heat of the climate is ſufficient, as in reptiles, inſects, &c. Theſe are ſtrictly oviparous animals.

322 Ovo-viviparous animals. The ovum, after being fecundated and detached from the ovarium, remains in ſome animals within the body of the mother, until the contained germ be developed and hatched. Theſe are *falſe viviparous* animals, or *ovo-viviparous.* The viper, and ſome fiſhes, afford inſtances of this proceſs. Mammalia alone are truly viviparous animals.

323 Viviparous generation. Their germ poſſeſſes no proviſion of nouriſhment, but grows by what it derives from the juices of the mother. For this purpoſe it is attached to the internal ſurface of the uterus, and ſometimes, by accident, to other parts, by a kind of root, or infinite ramification of veſſels, called *placenta.* It is not, therefore, completely ſeparated from the mother by its coverings. It does not come into the world until it can enjoy an independent organic exiſtence. The mammalia cannot, therefore, be ſaid to poſſeſs an *ovum* in the ſenſe which we have aſſigned to that term.

From this view of the ſubject, generation may be ſaid to conſiſt of four functions, differing in their importance, and in the number of animals to which they belong.

1. The *production of the germ,* which is a conſtant circumſtance; 2. *Fecundation,* which belongs only to the ſexual generation; 3. *Copulation,* which is confined to thoſe ſexual generations, in which fecundation is accompliſhed within the body; 4. *Uterogeſtation,* which belongs excluſively to viviparous generation *.

* Cuvier, lec. xxix.

There is a general rule obſervable among all quadrupeds, that thoſe which are large and formidable produce but few at a time; while ſuch as are mean and contemptible are extremely prolific. The lion, or tiger, have ſeldom above two cubs at a litter; while the cat, that is of a ſimilar nature, is uſually ſeen to have five or ſix. In this manner, the lower tribes become extremely numerous; and, but for this ſurpriſing fecundity, from their natural weakneſs, they would quickly be extirpated. The breed of mice, for inſtance, would have long ſince been blotted from the earth, were the mouſe as ſlow in production as the elephant. But it has been wiſely provided, that ſuch animals as can make but little reſiſtance, ſhould have at leaſt a means of repairing the deſtruction which they muſt often ſuffer, by their quick reproduction; that they ſhould increaſe even among enemies, and multiply under the hand of the deſtroyer. On the other hand, it has as wiſely been ordered by Providence, that the larger kinds ſhould produce but ſlowly; otherwiſe, as they require proportional ſupplies from nature, they would quickly conſume their own ſtore; and, of conſequence, many of them would ſoon periſh through want; ſo that life would thus be given without the neceſſary means of ſubſiſtence. In a word, Providence has moſt wiſely balanced the ſtrength of the great againſt the weakneſs of the little. Since it was neceſſary that ſome ſhould be great and others mean, ſince it was expedient that ſome ſhould live upon others, it has aſſiſted the weakneſs of one by granting it fruitfulneſs, and diminiſhed the number of the other by infecundity.

324 Comparative fecundity of animals.

In conſequence of this proviſion, the larger creatures, which bring forth few at a time, ſeldom begin to generate till they have nearly acquired their full growth. On the contrary, thoſe which bring many reproduce before they have arrived at half their natural ſize. Thus the horſe and the bull are at their beſt before they begin to breed: the hog and the rabbit ſcarce leave the teat before they become parents in turn. Almoſt all animals likewiſe continue the time of their pregnancy in proportion to their ſize (L).

325 For an account of the principal phenomena attending the reproduction of the human ſpecies, viz. the requiſites for conception and its ſigns; the effects of impregnation; the gradual evolution of the fœtus, and the ſucceſſive changes that take place in the uterine ſyſtem during uterogeſtation, ſee the article MIDWIFERY, chap. i. and ii. The phenomena of reproduction in other viviparous animals are ſo analogous to thoſe in the human ſpecies, that we need not enter on an examination of them. We ſhall here only give a view of the ſucceſſive changes that take place in the egg of birds during incubation, taken from the obſervations of the celebrated Blumenbach.

326 Progreſſive changes of the chick during incubation.

The following obſervations refer to the egg of the common hen, as affording the moſt familiar example of incubation.

A ſmall ſhining ſpot, of an elongated form, with rounded extremities, but narroweſt in the middle, is perceived at the end of the firſt day, not in nor upon the

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(L) In the following table are noted the time of geſtation, incubation, and the number of young produced in ſeveral ſpecies of quadrupeds and birds, as far as theſe have been aſcertained; and the ſecond column ſhews the period to which the life of each is uſually extended.

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the cicatricula (M), but very near that part on the yolk-bag. This may be ſaid to appear before-hand, as the abode of the chick which is to follow.

327
Second day.

No trace of the latter can be diſcovered before the beginning of the ſecond day; and then it has an incurvated form, reſembling a gelatinous filament with large extremities, very cloſely ſurrounded by the amnion, which at firſt can ſcarcely be diſtinguiſhed from it.

	Species.	Period of Life.	Time of Geſtation.	Number of Young.
Quadrupeds.	Apes.	- -	- - -	About 2.
	Bats.	- - -	- - -	From 2 to 5.
	Sloth.	- - -	- - -	One.
	Rhinoceros.	70 or 80 years.	- - -	One.
	Elephant.	Above 100 years.	21 months.	One.
	Arctic walrus.	- - -	9 months.	One.
	Seal.	- - -	- - -	About two.
	Bitch.	12 or 16 years.	9 weeks.	From 4 to 10.
	Wolf.	- - -	3½ months.	5 or 6.
	Fox.	About 14 years.	6 weeks.	From 3 to 6.
	Jackall.	- - -	- - -	From 6 to 8.
	Lioneſs.	Above 70 years.	- - -	4 or 5.
	Tigreſs.	- - -	- - -	Ditto.
	Cat.	From 10 to 18 years.	8 weeks.	From 4 to 6.
	Ferret.	- - -	6 weeks.	6 or 7.
	Otter.	- - -	9 weeks.	4 or 5.
	Virginian opoſſum.	- - -	- - -	Ditto.
	Kanguroo.	- - -	- - -	One.
	Mole.	- - -	- - -	4 or 5.
	Porcupine.	- - -	- - -	Two.
	Guinea pig.	6 or 7 years.	3 weeks.	From 5 to 12.
	Common rat.	- - -	5 or 6 weeks.	From 12 to 18.
	Mouſe.	From 2 to 3 years.	- - -	From 6 to 10.
	Common ſquirrel.	- - -	6 weeks.	From 4 to 5.
	Hare.	- - -	A month.	3 or 4.
	Rabbit.	- - -	Ditto.	About 8.
	Camel.	40 or 50 years.	12 months.	One.
	Rein deer.	15 or 16 years.	8 months.	Two.
	Stag.	Near 50 years.	5 months.	One.
	Goat.	- - -	5 months.	About 2 or 3.
	Ewe.	15 years.	Ditto.	From 1 to 3.
	Cow.	- - -	9 months.	1 to 3.
	Mare.	30 or 40 years.	11 months.	1 or 2.
	Sow.	Nearly 20 years.	4 ditto.	From 10 to 20.
			Time of Incubation.	
Birds.	Eagle.	Above 100 years.	30 days.	2 or 3.
	Raven.	Near 100 ditto.	20 ditto.	5 or 6.
	Cuckoo.	- - -	- - -	1 or 2.
	Humming bird.	- - -	12 days.	Two.
	Blackbird.	- - -	14 ditto.	4 or 5.
	Canary bird.	10 or 20 years.	Ditto.	Ditto.
	Wren.	- - -	Ditto.	From 10 to 18.
	Pigeon.	- - -	Ditto.	Two.
	Turkey.	- - -	A month.	18 or 20.
	Hen.	About 13 years.	3 weeks.	About 20.
	Oſtrich.	- - -	Six weeks.	One or two each.
	Swan.	Above 100 years.	Ditto.	6 or 8.
	Gooſe.	Near 100 years.	A month.	9 to 12.
	Duck.	- - -	Ditto.	12 to 14.

(M) The ſtructure of an egg has already been deſcribed under the article EGG; but for the better underſtanding of Blumenbach's obſervations, it may be neceſſary to enumerate the ſeveral parts, with the names given to them by that author. The membrane lining the ſhell is called *membrana albuminis*, and includes the two whites of the egg, the inner of which ſurrounds the yolk, which is contained within a peculiar, very delicate membrane, called the *yolk-bag*. From two oppoſite ſides of this bag proceeds a white knotty body, terminating in the white of the egg, by a flocculent extremity. Theſe bodies are called the *chalazæ* or *grandines*; the *cicatricula*, tread, or treadle, is ſurrounded by one or more whitiſh concentric circles called *halones*, or *circuli*, the uſe of which is not known.

About this time the halones enlarge their circles; but they ſoon after diſappear entirely, as well as the cicatricula.

The firſt appearance of red blood is diſcerned on the ſurface of the yolk-bag, towards the end of the ſecond day. A ſeries of points is obſerved, which form grooves; and theſe cloſing, conſtitute veſſels, the trunks of which become connected to the chick. The vaſcular ſurface itſelf is called *figura venoſa*, or *area vaſculoſa*; and the veſſel by which its margin is defined, *vena terminalis*. The trunk of all the veins joins the *vena portæ*; while the arteries, which ramify on the yolk-bag, ariſe from the meſenteric artery of the chick.

328 Third day. On the commencement of the third day, the newly formed heart is diſcerned by means of its triple pulſation, and conſtitutes a threefold *punctum ſaliens*. Some parts of the incubated chicken are deſtined to undergo ſucceſſive alterations in their form; and this holds good of the heart in particular. In its firſt formation it reſembles a tortuous canal, and conſiſts of three dilations lying cloſe together, and arranged in a triangle. One of theſe, which is properly the right, is then the common auricle; the other is the only ventricle, but afterwards the left; and the third is the dilated part of the aorta.

About the ſame time, the ſpine, which was originally extended in a ſtraight line, becomes incurvated; and the diſtinction of the vertebræ is very plain. The eyes may be diſtinguiſhed by their black pigment, and comparatively immenſe ſize; and they are afterwards remarkable in conſequence of a peculiar ſlit in the lower part of the iris.

329 Fourth day. From the fourth day, when the chicken has attained the length of four lines, and its moſt important abdominal viſcera, as the ſtomach, inteſtines, and liver, are viſible, (the gall-bladder, however, does not appear till the ſixth day), a vaſcular membrane begins to form about the navel; and increaſes in the following days with ſuch rapidity, that it covers nearly the whole inner ſurface of the ſhell, within the *membrana albuminis*, during the latter half of incubation. This ſeems to ſupply the place of the lungs, and to carry on the reſpiratory proceſs inſtead of thoſe organs. The lungs themſelves begin indeed to be formed on the fifth day; but, as in the fœtus of the mammalia, they muſt be quite incapable of performing their functions while the chick is contained in the amnion.

330 Sixth day. Voluntary motion is firſt obſerved on the ſixth day, when the chick is about ſeven lines in length.

331 Ninth day. Oſſification commences on the ninth day, when the oſſific juice is firſt ſecreted, and hardened into bony points. Theſe form the rudiments of the bony ring of the ſclerotica, which reſembles at that time a circular row of the moſt delicate pearls.

At the ſame period, the marks of the elegant yellow veſſels on the yolk-bag, begin to be viſible.

332 Fourteenth day. On the fourteenth day the feathers appear; and the animal is able to open its mouth for air, if taken out of the egg.

333 Nineteenth day. On the nineteenth day it is able to utter ſounds; and on the twenty-firſt to break through its priſon, and commence a new life.

Blumenbach concludes his obſervations with a few remarks on thoſe very ſingular membranes, the yolk-bag and the chorion, which are ſo eſſential to the life and preſervation of the animal.

334 Remarks on the chorion. The chorion, that moſt ſimple yet moſt perfect temporary ſubſtitute for the lungs, if examined in the latter half of incubation in an egg very cautiouſly opened, preſents, without any artificial injection, one of the moſt ſplendid ſpectacles that occurs in the whole organic creation. It exhibits a ſurface covered with numberleſs ramifications of arterial and venous veſſels. The latter are of a bright ſcarlet colour, as they are carrying oxygenated blood to the chick; the arteries, on the contrary, are of a deep or livid red, and bring the carbonated blood from the body of the animal. Their trunks are connected with the iliac veſſels; and, on account of the thinneſs of their coats, they afford the beſt microſcopical object for demonſtrating the circulation in a warm-blooded animal.

335 On the yolk bag. The other membrane is alſo connected to the body of the chick; but by a two-fold union, and in a very different manner from the former. It is joined to the ſmall inteſtine, by means of the *ductus vitello-inteſtinalis*, and alſo by the blood-veſſels, with the meſenteric artery and vena portæ.

In the courſe of the incubation the yolk becomes conſtantly thinner and paler, by the admixture of the inner white. At the ſame time innumerable fringe-like veſſels with flocculent extremities, of a moſt ſingular ſtructure, form on the inner ſurface of the yolk-bag, oppoſite to the yellow ramified marks, and hang into the yolk. There can be no doubt that they have the office of abſorbing the yolk, and conveying it into the veins of the yolk-bag, where it is aſſimilated to the blood, and applied to the nutrition of the chick. Thus in the chick which has juſt quitted the egg, there is only a remainder of the yolk and its bag to be diſcovered in the abdomen. Theſe are completely removed in the following weeks, ſo that the only remaining trace is a kind of cicatrix on the ſurface of the inteſtine *.

Many of the cauſes which contribute to the formation of a living body have hitherto eluded human reſearch; may in all probability never be diſcovered; and perhaps are beyond human comprehenſion.

336 Theories of generation. 337 Hypotheſis of ſucceſſive evolution. Some philoſophers, diſcovering the extreme diviſibility of matter, and learning from the microſcope that transformation is but the developement of certain parts that previouſly exiſted, have thence imagined that generation is ſomewhat analogous; that all organiſed bodies received their form at the beginning; that the firſt of every genus and ſpecies contained by involution the numberleſs millions of ſucceeding generations; and that the union of the two ſexes gives only a ſtimulus, and brings into view forms that had exiſted ſince the world began.

338 Objections. By this hypotheſis they have attempted to explain a thing that is unknown by what muſt remain for ever incomprehenſible to the human mind in its preſent ſtate. They abſurdly appeal from obſervation to conjecture; and ſuppoſe that bodies which are originally brought into view, which are daily augmented, frequently repaired, and ſometimes renewed by organic action, do nevertheleſs in their firſt formation require an effort ſuperior to what omnipotence is able to perform by ſecondary agents. Had the ſupporters of this hypotheſis conſidered that many herbaceous plants produce new flowers

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* *Blumenbach's Comp. Anat.* chap. xxvii.

when the firſt ſet are untimely cut off; that lobſters and many other animals renew their limbs, and that certain polypes can raiſe a ſtructure ſo perfectly reſembling a vegetable form as to puzzle the naturaliſt whether or not he ſhould claſs them under plants, they would ſurely not have preſcribed ſuch bounds to omniſcient wiſdom and almighty power, or declared with ſuch confidence what the Author of nature, to ſpeak with the vulgar, muſt neceſſarily perform by his own hands, or what he may intruſt to ſecondary cauſes regulated by his laws.

Theſe philoſophers will find it difficult to account in a very ſatisfactory manner for monſtrous productions, and for thoſe changes of ſtructure and of form which for a while continue hereditary from the influence of habit. They object to others, that all the parts of a living body are mutually dependent on one another, and that they muſt neceſſarily have been coeval, or have exiſted at once. But though every attempt that has yet been made to aſcertain which of the vital organs are prior and which poſterior in a living body has proved unſucceſsful, it has not been demonſtrated that either themſelves or their functions are coeval. It may, on the contrary, be plainly demonſtrated from obſervation, that the lungs and the ſtomach do not begin to perform their functions ſo early as the heart and the vaſcular ſyſtem; that even the heart and its ſyſtem perform their functions with ſome conſiderable changes, immediately after birth; that the vegetable tribes are without nerves; and that the brain and nerves in the animal kingdom perform more and more of their functions, according as the ſyſtem approaches towards maturity. It has even been ſhewn, that bones will unite; that the limbs of an animal continue to be nouriſhed without the nerves; that there is a principle of life in the blood; that the heart will act under other ſtimuli beſide that of nervous influence; and ſound logic does by no means require us to ſuppoſe, that the firſt action of the fœtal heart, or the *punctum ſaliens*, is owing to the influence of ſtimuli from the brain, or that the brain muſt have exiſted when the heart firſt moved. Although the minuteneſs and tranſparency of the parts may prevent us from ſeeing the firſt gradual formation of the embryo, yet every obſervation corroborates the opinion, that it is formed by ſecondary cauſes, and through the medium of organic powers.

339
Hypotheſis of Epigeneſis.

Moſt phyſiologiſts have believed, the certain inorganic particles are contained in the ſyſtem of one ſex or of the other, and that by the union of the ſexes theſe particles have become organiſed. It has, however, been aſked whether or not is the embryo formed by the joint operation of the two ſexes? or is it formed entirely by one, and brought into action by a ſtimulus from the other? The former of theſe queſtions ſuppoſes that each of the ſexes has a ſeminal fluid; that ſome mixture takes place in the uterus, and produces an embryo, in the ſame manner that a neutral ſalt aſſumes a certain and determinate form. The notion implies ſome general and confuſed ideas of chemical combination; but does not beſpeak a very clear underſtanding, profound reflection, or much acquaintance with the nature and properties of living bodies.

For a long time paſt the moſt rational phyſiologiſts have generally thought that the embryo is formed gradually and ſlowly in one or other of the two ſexes, not by chemical combination, but a ſyſtem of organs, directed by laws and prompted by ſtimuli, with many of which we are yet unacquainted. From the great Hippocrates to Fabricius and Harvey, the credit of furniſhing the fœtal embryo was almoſt univerſally given to the females of oviparous animals. Among the viviparous, appearances were ſuch, that the female was left to conteſt it with the male. At laſt the eclat of Leeuwenhoek's diſcoveries ſeemed to put an end to all doubts entertained upon the ſubject. He very plainly ſaw through his microſcope that very great profuſion of particles that move to and fro with amazing rapidity in the male ſemen. Upon this he embraced the doctrine of Hamme, who had ſeen them before, and ſuppoſed from their motions that theſe particles were not only animalcules, but the principles or rudiments of that animal in whom they were formed, and that they were depoſited in the uterus of the female only to be nouriſhed and augmented in ſize.

340
Embryo ſuppoſed to be derived from the male.

341
Objections.

What raiſed objections againſt this theory was, that numerous animalcules were diſcoverable by the microſcope in other fluids, and that a vaſt profuſion of young embryos appeared in caſes where never more than one or two arrive at maturity. It was an objection to it, that ſome females had been impregnated, where the hymen remained unbroken, ſo that the impregnating fluid could have reached only the mouth of the uterus. Again, in frogs, fiſhes, and many other animals, the ova are not impregnated till after extruſion; and laſtly, Haller had obſerved the chick completely formed in eggs that had not been fecundated.

It is now, we believe, pretty generally known, that the embryo does not commence its exiſtence in the cavity of the uterus. De Graaf obſerved it on its paſſage down the fallopian tube; he ſaw the place where it firſt began in the ovarium of the female, and caſes have occurred where it has miſſed the fallopian tube, where it has fallen into the abdomen, in which the placenta has been formed, and the fœtus has grown among the bowels.

342
More probable that the embryo exiſts in the female.

From theſe facts it has been concluded, notwithſtanding ſome feeble objections, that the female ovaria contain the embryos in the form of eggs; that theſe eggs are brought into action by the ſtimulating power of the male ſemen, which is ſometimes thrown into the cavity of the uterus, ſometimes applied only to its mouth, and ſometimes ſprinkled on the eggs after they are extruded. For more on this ſubject ſee the article MIDWIFERY.

343
Relations.

A view of the relations between the preſent function and thoſe which we have before examined, is a ſubject of ſo delicate a nature, that we muſt not enlarge on it. The ſympathy between the reproductive and the nervous ſyſtems is well known. The effect which deſire has occaſionally produced on the brain is very great, madneſs being not unfrequently the conſequence, either of too much indulgence, or of total continence. We are of opinion that the influence of the fancy or imagination on the uterine ſyſtem has been over-rated, though the accounts given of monſters or deformed births, in conſequence of terror experienced by the mother, appear to be too well authenticated to warrant our total diſbelief in this influence. Too much indulgence in this appetite produces a debilitated ſtate, both of the mental and bodily functions, and deprives the ſyſtem of that natural ſtimulus which ſeems eſſential to the activity and vigour of the body in the male.

Chap. XV. *Of Sleep and Torpor.*

344 Neceſſity of ſleep.

We have already conſidered the active means by which the waſte of the body is repaired; but all theſe would have little effect, and could not indeed be carried on for any conſiderable time, without ſome general relaxation of the ſyſtem. This relaxation is brought about by ſleep, in which the active functions find a repoſe from the labours which they have undergone during the day; and in this way the ſyſtem is recruited more completely than by any other means.

345 Sleep, an affection of mind.

Sleep may be conſidered as an affection of mind, and therefore more properly a ſubject of metaphyſical, than of phyſiological ſpeculation. It is, however, generally treated of in ſyſtems of phyſiology; and it will be neceſſary to take notice of ſome circumſtances reſpecting it. We ſhall chiefly conſider the ſtate of the body and mind during ſleep, and ſome of the principal theories that have been contrived to account for it.

346 Phenomena of ſleep.

Natural ſleep returns at certain intervals, which, are, however, different in different animals. Moſt animals, and eſpecially man, ſleep only during the night, but moſt of the predacious ſpecies, as beaſts and birds of prey, chooſe this time for their predatory excurſions, and repoſe during the day. Sleep comes on with an unuſual languor and laſſitude; an averſion to motion; the mind becomes unfit for its uſual exertions; and the deſire of reſt pervades the whole ſyſtem. In particular, the extenſor muſcles loſe their power of preſerving the body in an erect poſture; the eyelids involuntarily fall; the head bows forward; the joints bend, and the body ſinks. During ſleep, all the voluntary motions are in general ſuſpended; but the involuntary actions of the heart and lungs proceed, though not ſo vigorouſly as in the waking ſtate; the circulation and reſpiration being ſlower than uſual. Moſt of the ſenſes are alſo in a ſtate of repoſe, eſpecially thoſe of feeling, ſmell, and probably of taſte. Hearing is, in ſome animals, very acute during ſleep, and they are thus enabled to eſcape any danger that threatens them. Some animals, as the hare, alſo ſleep with their eyes open; and in moſt the impreſſion of light, when the eyelids are raiſed, is very evident. The functions of digeſtion, abſorption, and ſecretion, ſeem to proceed with greater eaſe and activity during ſleep; and aſſimilation and nutrition are much promoted by this ſtate of repoſe. Some of the faculties of the mind, eſpecially the imagination, are, however, in full vigour, as appears from the dreams that take place during ſleep. The duration of ſleep is exceedingly various. Among the human ſpecies, young children, and very old perſons, paſs the greateſt half of their time in ſleep, while middle-aged and active people ſeldom ſleep ſo much as one third of the 24 hours.

Though the returns of ſleeping and waking depend much on cuſtom, they may, however, be changed by various circumſtances; and though the commencement of one of theſe periods happen to be altered, that of the other may remain as before. If a perſon is accuſtomed to go to ſleep exactly at nine in the evening, and to riſe again at ſix in the morning, though the time of ſleep may be occaſionally protracted till twelve, he will yet awaken at his uſual hour of ſix; or if his ſleep be continued by darkneſs, quietneſs, or ſimilar cauſes, till the day be farther advanced, the deſire of ſleep will return in the evening at nine.

347 Theory of ſleep.

Moſt of the cauſes that produce or prevent ſleep, have been mentioned in the article Medicine, N° 94. As to the immediate cauſe, the opinions of phyſiologiſts are much at variance, and the theory of ſleep is as little underſtood as that of any function of the animal economy.

348 Hypotheſis of Haller.

According to Haller, ſleep ariſes, either from a ſimple abſence, deficiency and immobility of the ſpirits, or from compreſſion of the nerves, and always from the motion of the ſpirits through the brain being impeded *. That ſleep is, ſome how or other, connected with a compreſſion of the brain, appears very probable, from the heavineſs and coma that take place in caſes where ſuch a compreſſion has evidently been produced; but how this compreſſion acts has never yet been ſatisfactorily explained; and the obſtruction that Haller ſuppoſes in the motion of the animal ſpirits, or nervous fluid, is gratuitous.

349 Of Brown.

One of the faſhionable doctrines of the preſent day reſpecting the immediate cauſe of ſleep is, that this ſtate is produced by an exhauſtion of irritability or excitability. According to Brown, ſleep ſucceeds a diminution of excitement, during which the excitability is either only ſo far diminiſhed that it can be accumulated again, or ſo abundant, that the exceſs can be waſted, and in each caſe the excitement reſtored †.

350 Of Darwin.

Similar to this is the doctrine of Zoonomia, that ſleep depends on an exhauſtion of ſenſorial power. Dr Darwin thus characterizes perfect ſleep: 1. The power of volition is totally ſuſpended. 2. The trains of ideas cauſed by ſenſation proceed with greater facility and vivacity; but become inconſiſtent with the uſual order of nature. The muſcular motions cauſed by ſenſation continue; as thoſe concerned in our evacuations during infancy, and afterwards in digeſtion, and in priapiſmus. 3. The irritative muſcular motions continue, as thoſe concerned in the circulation, in ſecretion, and reſpiration. But the irritative ſenſual motions, or ideas, are not excited; as the immediate organs of ſenſe are not ſtimulated into action by external objects, which are excluded by the external organs of ſenſe; which are not in ſleep adapted to their reception by the power of volition, as in our waking hours. 4. The aſſociate motions continue, but their firſt link is not excited into action by volition, or by external ſtimuli. In all reſpects, except thoſe above mentioned, the three laſt ſenſorial powers are ſomewhat increaſed in energy during the ſuſpenſion of volition, owing to the conſequent accumulation of the ſpirit of animation ‡.

Thus, the immediate cauſe of ſleep conſiſts in the ſuſpenſion of volition produced by the exhauſtion of ſenſorial power; and hence, whatever diminiſhes the general quantity of ſenſorial power, acts as a remote cauſe of ſleep.

Beſide the inſufficiency of theſe hypotheſes to account for many circumſtances that take place during ſleep, we may remark, that this ſtate is often produced when no exhauſtion of irritability, excitability, or ſenſorial power, can be ſuppoſed to have taken place. Thus, the propenſity to ſleep often becomes irreſiſtible from the effects of monotonous ſpeaking, from ſtillneſs, darkneſs, or from the ſameneſs of the ſcenery around us; and when one ſtimulus, after long continuation, can excite no more, another ſtimulus that in ordinary caſes is leſs powerful, produces excitement, and keeps off ſleep; an evident proof that excitability or ſenſorial power have not been very far exhauſted.

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* *First Lines of Physiology*. §. 385.

† *Elem. Med.* §. 337.

‡ *Darwin's Zoonomia*, vol. i. §. 18.

351 Supposed ſleep of plants. Plants have been ſaid to ſleep. At the approach of night, many of them are obſerved to change their appearances very conſiderably, and ſometimes even to ſuch a degree as ſcarcely to be known for what they are. Theſe changes happen principally to the leaves and the flowers. During the night, many leaves, according to the nature and genus of the plant, are ſeen to riſe up, to hang down, or to fold themſelves in various ways, for the protection of the flowers, the buds, the fruits, the young ſtems: and many flowers, to eſcape a ſuperabundance of moiſture, to hang down their mouths towards the earth, or to wrap themſelves up in their calices. Theſe phenomena are owing to ſtimuli acting from without: we may add, that moſt of the motions are performed at the joints where the leaves and petals are attached with the ſtem. A period of reſt is as neceſſary to plants as ſleep is to animals. The irritable principle cannot act long under the influence of the ſame ſtimulus, except at intervals, and the rapid growth obſervable in plants during the night, is a ſtrong proof that the organs employed in aſſimilation had been diſturbed in diſcharging their functions during the day, when expoſed to the action of heat and light and of other ſtimuli.

352 Dreaming. In our general outline, we had propoſed introducing here an account of the phenomena of dreams, but we find that this ſubject has been ſo fully diſcuſſed under the article DREAM, that any additional remarks would be unneceſſary. To this article therefore we refer the reader.

Rules for the management of the body with reſpect to ſleep, ſcarcely come within our preſent province; but as we paſs ſo much of our time in this ſtate, during which we are ſometimes occupied in a very agreeable manner, while at others we are ſubject to moſt uneaſy ſenſations, it is a matter of conſiderable conſequence to take thoſe meaſures which may ſecure to us the former, and enable us to avoid the latter. We have ſeen no rules better adapted to theſe purpoſes than thoſe of Dr Franklin; but as more important matter preſſes for inſertion within the circumſcribed limits to which we are reſtricted, we muſt refer our readers to the original paper, which is publiſhed in the late 8vo edition of *Franklin's Works*, vol. iii. p. 437.

353 Somnambuliſm. In a few caſes, not only the imagination has a full range during ſleep, but the voluntary motions of the body, and even the exerciſe of ſome of the external ſenſes, are carried on with apparently as much perfection as when the perſon is awake. This ſtate is called *ſomnambuliſm*, or ſleep walking, and is commonly conſidered as a variety of dreaming. Many ſurpriſing accounts have been given of ſleep-walkers. They have been known to riſe, dreſs themſelves, go out of doors, and ſometimes out of a window, from which they have climbed upon the roof of a houſe, dig in a garden, draw water from a well, ſaddle a horſe and ride ſeveral miles; maintain a rational and intereſting converſation, and even go through laborious and difficult literary taſks; and after having performed their taſk, they have returned again to their bed without being conſcious of what they had been doing. The want of conſciouſneſs appears from their remembering nothing when they awake, of what paſſed during their ſleep. It is diſputed whether ſomnambuliſts are in as much danger in the actions which they perform, as thoſe who are awake, in ſimilar circumſtances. We are inclined to think that the danger is much leſs in the former caſe, as ſleep-walkers ſeem entirely free from the terror which commonly attends the attempting of any hazardous enterpriſe when awake; ſuch as mounting to the roof of a houſe, climbing a ſteeple, &c. If ſuddenly awaked, however, while engaged in any of their hazardous actions, the danger is very great.

354 Dr Darwin conſiders ſomnambuliſm, not as a ſtate of ſleep or dreaming, but as a variety of reverie, carried to a morbid extent, ſo as to become a ſort of epileptic or cataleptic paroxyſm. In the ſtate of reverie, according to Dr Darwin, the irritative motions occaſioned by internal ſtimuli continue, thoſe from the ſtimuli of external objects are either not produced at all, or are not ſucceeded by ſenſation or attention, unleſs they are at the ſame time excited by volition; the ſenſitive motions continue, and are kept conſiſtent by the power of volition; the voluntary and aſſociate motions continue undiſturbed. He conſiders reverie as an effort of the mind to relieve ſome painful ſenſation, whence it is allied to convulſion and inſanity *.

355 Torpor of [illegible]. The torpor that takes place in many animals during winter, appears to be ſo nearly allied to ſleep, that we ſhall conſider it in this chapter.

A great variety of animals of almoſt every claſs, retire during the cold of winter, to the receſſes of caverns, holes in old walls, hollow trees, or below the earth, where they remain in apparently a lifeleſs ſtate till the return of ſpring rouſes them from their trance. We ſhall here enumerate the different animals that have been known to undergo this ſtate of hibernation.

356 [illegible] Bats, eſpecially the *veſpertilio* [illegible], and [illegible] (ſee MAMMALIA, N° [illegible]); *bears*, eſpecially the brown and the polar bear, and the badger; the hedgehog (*erinaceus* [illegible]); ſeveral ſpecies of the mouſe and rat tribe, but more eſpecially the *hamſter* (*mus cricetus*), the *marmot*, eſpecially the [illegible] *marmota*, (ſee MAMMALIA, N° [illegible]), the *dormouſe* ([illegible]). [illegible] capable of living for a conſiderable time in a torpid ſtate, as they have been known to remain alive for ſeveral weeks, buried under the ſnow.

357 Hibernation [illegible]. It does not appear that birds in general are capable of undergoing this ſtate of exiſtence; but the inſtances of ſwallows that have been found in this ſtate in old walls and hollow trees, and even, as ſome affirm, below water, and have recovered life and activity on being expoſed to gradual warmth, are too well authenticated to admit a doubt, that theſe at leaſt ſometimes hibernate.

358 Moſt reptiles and ſerpents paſs the winter in a ſtate of hibernation; but this is more particularly the caſe with the land tortoiſe (*teſtudo græca*, ſee ERPETOLOGY, p. 2[illegible]1); frogs, and thoſe lizards which inhabit cold climates.

359 It is not certainly known whether many kinds of fiſhes become torpid in winter; but there is no doubt that ſeveral of them are ſuſceptible of this ſtate *, and [illegible] that in North America, eſpecially [illegible]

* Zoonomia, [illegible] 19.

* [illegible]

bay, fiſhes are not unfrequently found included within a body of ice, and when expoſed to gentle heat, have recovered life and motion.

360 Of inſects. Almoſt all inſects remain, during the winter, in a torpid ſtate. This happens principally to the chryſolites, and ſuch grubs as cannot, in that ſeaſon, procure their food.

361 Of man. It will appear extraordinary that we ſhould place man among the hibernating animals; and yet there ſeems little doubt, that even he is capable of having his life ſuſpended for a conſiderable time, when expoſed to thoſe cauſes which bring about the torpidity of thoſe animals that we have already mentioned. We are told of a woman who, in February 1789, remained eight days buried in the ſnow, and ſtill recovered; and the caſe of the three women who remained for 37 days in a ſtable at Bergamoletto, that had been overwhelmed by an *avalanche*, or ſnow heap, with no other ſuſtenance than the milk of a half-ſtarved ſhe goat, is well known. Theſe inſtances, added to others of perſons who have paſſed ſeveral weeks in a ſtate of almoſt uninterrupted ſleep, tend to prove that man himſelf may, under certain circumſtances, continue in a torpid ſtate.

362 Principal phenomena of hibernation. During this ſtate of torpidity, the animals ſcarcely appear to live; ſenſation ſeems altogether loſt; their irritability is ſo much diminiſhed, that they may be cut, torn, or even broken to pieces, without expreſſing any mark of feeling, or giving any ſign of motion; digeſtion ſeems entirely ſuſpended; the ſecretions and excretions are diſcontinued. Some of the functions, however, are carried on. Reſpiration and circulation, though very languid, and ſometimes ſcarcely perceptible, appear to go on in a degree ſufficient to preſerve the exiſtence of the animal; and the action of the abſorbents ſeems to be very little diminiſhed, as appears from the gradual abſorption of the fat. If the animal is taken from its place of confinement, and expoſed to a gentle heat, it gradually recovers all its faculties; but if carried back to its cell, it relapſes into the ſtate of torpidity.

363 Suſpended animation of ſome animals. The long ſuſpenſion of animation, of which ſeveral animals are ſuſceptible, appears ſtill more extraordinary than the torpidity above deſcribed. The common hair worm *(gordius aquaticus)* may, when dried, be preſerved for an indefinite length of time, and when put into water, gradually recovers its uſual activity of motion. See HELMINTHOLOGY, N° 32. One of the moſt remarkable caſes of this ſuſpended animation is that related of the garden ſnail, of which the following curious account has been given in the Philoſophical Tranſactions for 1774. Mr Stuckey Simon, a merchant in Dublin, whoſe father, a fellow of the Royal Society, and a lover of natural hiſtory, left to him a ſmall collection of foſſils and other curioſities, had amongſt them the ſhells of ſome ſnails. About 15 years after his father's death (in whoſe poſſeſſion they were many years), he by chance gave to his ſon, a child about 10 years old, ſome of theſe ſhells to play with. The boy put them into a flower-pot, which he filled with water, and the next day into a baſon. Having occaſion to uſe this, Mr Simon obſerved that the animals had come out of their ſhells. He examined the child, who aſſured him that they were the ſame he had given him, and ſaid he had alſo a few more, which he brought. Mr Simon put one of them into water, and in an hour and a half after obſerved that it had put out its horns and body, which it moved but ſlowly, probably from weakneſs. Major Vallancy and Dr Span were afterwards preſent, and ſaw one of the ſnails crawl out, the others being dead, moſt probably from their having remained ſome days in the water. Dr Quin and Dr Rutty alſo examined the living ſnail ſeveral times, and were greatly pleaſed to ſee him come out of his ſolitary habitation after ſo many years confinement. Dr Macbride, and a party of gentlemen at his houſe, were alſo witneſſes of this ſurpriſing phenomenon. Dr Macbride has thus mentioned the circumſtance: "After the ſhell had lain about ten minutes in a glaſs of water that had the cold barely taken off, the ſnail began to appear; and in five minutes more we perceived half the body puſhed out from the cavity of the ſhell. We then removed it into a baſon, that the ſnail might have more ſcope than it had in the glaſs; and here, in a very ſhort time, we ſaw it get above the ſurface of the water, and crawl up towards the edge of the baſon. While it was thus moving about, with its horns erect, a fly chanced to be hovering near, and, perceiving the ſnail, darted down upon it. The little animal inſtantly withdrew itſelf into the ſhell, but as quickly came forth again, when it found the enemy was gone off. We allowed it to wander about the baſon for upwards of an hour, when we returned it into a wide-mouthed phial, wherein Mr Simon had lately been uſed to keep it. He was ſo obliging as to preſent me with this remarkable ſhell; and I obſerved, at twelve o'clock, as I was going to bed, that the ſnail was ſtill in motion, but next morning I found it in a torpid ſtote, ſticking to the ſide of the glaſs."

The ſtill more extraordinary inſtances that have been related, on what many have conſidered authentic teſtimony, of toads having been found incloſed in the trunk of a large tree, or within a ſolid block of ſtone, appear almoſt incredible; and yet if we conſider that M. Heriſſant preſerved toads in a ſtate of ſuſpended animation for 18 months, in boxes covered with a thick coating of mortar (ſee ERPETOLOGY, p. 286.); that the ſnails mentioned in the above quotation, muſt have lain for at leaſt 20 years; and that flies have been recovered after being immerſed for many months in Madeira wine, it is difficult to ſay how long this ſuſpended animation may not be continued.

364 Hibernation of plants. Similar phenomena take place in the vegetable creation. Moſt of thoſe plants which ſurvive one year, ſhed their leaves on the approach of winter; and, during this ſeaſon, the motion of the ſap ceaſes, and they have all the appearance of dead ſhrubs. The herbaceous tribes even die down to the roots, which, being moſtly of the bulbous kind, afford ſhelter to the ſurviving germ; and are hence called, by botaniſts, the *hybernacula* of plants. On return of ſpring, the plant ſhoots anew from its winter's retreat, and flouriſhes with its former ſtrength and beauty.

Some plants are even capable of having their vitality, or rather the exerciſe of all their functions, ſuſpended, as in the *gordius* and the ſnail, for an indefinite length of time. *Moſſes* have been kept in a dried ſtate in a *hortus ſiccus* for many years, and have ſhown no ſign of life, till they were moiſtened and expoſed to air, light, and a moderate heat, when they have recovered all their powers, have erected their ſtems, ſhot forth new branches, and flouriſhed as at firſt.

Of Sleep and Torpor.

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Theory of torpor.

It is almoſt impoſſible, in the preſent ſtate of our phyſiological knowledge, to give any rational theory of theſe phenomena. The torpor of animals has been attributed to exhauſted excitability, or exhauſted ſenſorial power; to the effects of habit, and to the effect produced on the brain by ſuſpended or diminiſhed reſpiration. The laſt of theſe, though not quite ſatisfactory, appears to us the moſt probable hypotheſis. It has been ably defended and illuſtrated by Dr George Kellie, in a paper in which he relates a remarkable caſe of torpor from cold.

"The powers of voluntary motion and of ſenſation (ſays Dr Kellie), are known to depend immediately upon the conditions of the brain and nerves; if, therefore, we could diſcover in what manner theſe organs are affected by any of the preceding events, we ſhould advance conſiderably towards the ſolution of the queſtions above ſtated. (*Namely, What is the order of ſucceſſion between the diminiſhed irritability of the heart, in conſequence of the abſtraction of caloric, and the complete torpor of the voluntary muſcles and of the organs of ſenſe, and how are the intervening effects connected?*) Were the inactivity of theſe organs the direct effect of their diminiſhed temperature; did the torpor in no caſe happen, till the heat of the brain and nerves was reduced beneath the natural ſtandard, there could be hardly ground for any farther inquiry. But, as it is not ſo, ſome other change, leſs direct, muſt have occurred, in conſequence of the connection of the brain with, and its dependence upon, ſome other of the functions antecedently and more immediately affected; and this function I apprehend to be reſpiration, between which and the energies of the nervous ſyſtem a very intimate connection is maintained, through the changes produced on the blood during the pulmonary circulation. This dependence of the brain upon the properties of the blood, maintained by reſpiration, is evinced by a great variety of obſervations. Whatever impedes the reſpiratory changes of the circulating fluid debilitates or deſtroys the powers of muſcular motion, as the reſpiration of noxious gaſes, of reduced or rarefied atmoſphere; while greater exertions of muſcular powers call for, and give occaſion to more frequent reſpiration, more rapid conſumption of air, and greater changes of the blood; and the breathing of more effective gaſes, as of the nitrous oxide, increaſes the motive and ſenſitive powers of animals. That theſe effects depend immediately upon the properties of the blood, as modified by reſpiration, acting on the brain has, I think, been proved by the experiments of Bichat, who, in a maſterly manner, has traced the mutual connection and dependencies of the vital functions in his admirable *Recherches Phyſiologiques ſur la Vie et la Mort*. The transfuſion or injection of venous blood into the carotids induced aſphyxia or death, the inſtant it reached the brain; an effect which did not follow the ſimilar transfuſion of arterial blood from the carotid of another *. By theſe experiments, and by ſeveral other obſervations, he has ſhewn, that the aſphyxia which ſo uniformly follows impeded or ſuſpended reſpiration is occaſioned by the impreſſion of dark, venous, unchanged blood upon the brain, and not, as has commonly been ſuppoſed, from this blood being incapable of ſtimulating the left ſide of the heart, which, on the contrary, continues to contract and to circulate the blood for ſome time after the voluntary functions are ſuſpended; an obſervation confirmed alſo by Coleman and others.

"Such, then, [illegible] upon the functions of reſpiration [illegible] in [illegible] obſervations which [illegible] lity of the nervous ſyſtem [illegible] rectly too, on the ſtate of reſpiration.

"In the period [illegible] reſpiration is completely [illegible] changes produced on the blood by that function totally prevented. This, which appeared from a [illegible] obſervations on the winter quarters of ſuch [illegible] imbedded in mud, incaſed in ice, or cloſed up in opercula of their own conſtruction, for the occaſion of excluding the air, has been amply confirmed by the pointed experiments of Spallanzani, [illegible]

"In every caſe of torpor [illegible] tion falls ſhort of this complete [illegible], it is at leaſt more or leſs impaired. How much the torpid ſtate depends on this condition of the reſpiratory functions, farther appears from obſerving, that hibernating animals, even thoſe not of the amphibious order, warned by the approach of winter, inſtinctively or induſtriouſly ſeek ſituations unfavourable to perfect reſpiration, where this function may be either inadequately or not at all performed, as by premature and involuntary interment under ground, in old walls, in mud, at the bottom of lakes, &c. The inſtinct of theſe animals, too, has been finely imitated by experiment, illuſtrating at once the object of this inſtinct, and confirming the opinion here advanced of its tendency. Thus the torpid hamſter was found to regain and preſerve its activity, when freely expoſed to a pure atmoſphere, the temperature, at the ſame time, not exceeding that at which it had formerly become torpid, or at which it returned to that ſtate when again ſecluded under ground †. Theſe obſervations ſeem concluſive on this point, and, with thoſe already brought forward concerning the intimate connection eſtabliſhed between the properties of the blood, as modified by reſpiration, and the functions of the brain, render it, I think, highly probable, that the torpor of the voluntary powers, in the caſes now under conſideration, is the conſequence of a limited and imperfect reſpiration, antecedently induced by diminiſhed temperature.

"Obſervation, indeed, is more deficient on this point with regard to the higher orders of animals, and to men, who only occaſionally become torpid from cold. Yet more than analogy, which is here very ſtrong, leads me to believe that, even in theſe, the functions of reſpiration are much and neceſſarily affected. The examples of cattle and of men remaining long torpid, deeply buried under ſnow, are pretty direct and convincing proofs of this.

"If our induction from all theſe obſervations be admitted, we have the rudiments of a theory adequate to the explanation of the phenomena, in ſo far, at leaſt, as the torpor of the voluntary powers is concerned.

"From the ſuſpended or imperfect reſpiration, thoſe changes, by which the blood is fitted for maintaining the activity of the ſenſorial ſyſtem, are interrupted; this imperfect blood circulating ſlowly through the brain directly impedes its functions, and ſo debilitates the excitability of the motive and ſenſitive organs, that they become torpid. This enunciation may ſeem hypothetical; but let the [illegible] of the intimate [illegible] between the reſpiratory and ſenſorial functions be [illegible].

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* Bichat, Recher- [illegible] p. 7.

† Buffon's Nat. Hiſt.

[illegible] consider with the interrupted respiration of hibernating and torpid animals, their instincts with regard to this, and the greater facility with which torpor is induced in a confined situation, which they naturally seek; and compare these with the observations and experiments of Bichat on the effects of the immediate impression of venous blood upon the brain, and you will perceive a connected system, not entirely fanciful, a theory not without foundation and strength, and which appears to me at least to merit some attention *."

* Edin. Med. and Surg. Journ. [illegible] p. 3[illegible].

For further particulars reſpecting the torpidity or hibernation of animals, we refer the reader to Spallanzani's *Tracts on Animal and Vegetables*; White's *Natural Hiſtory of Selborne*; Barton's *Fragments of the Natural Hiſtory of Pennſylvania*; Pennant's *Arctic Zoology*; La Cepede *on Oviparous Quadrupeds, as tranſlated by Kerr*; Townſon's *Tracts on Natural Hiſtory and Phyſiology*, and the *Inaugural Diſſertation of* Dr Reeve *de Animalibus in Hieme Sopitis*, publiſhed at Edinburgh in 1803.

Chap. XVI. *Of Death.*

366 In the article Man, (N° 33. *to the end*) we have traced the progreſs of human life, from the *cradle* to the *grave*; and have briefly conſidered the phenomena and the conſequences of natural *death*. In that article, and Longevity, we have alſo ſtated the natural duration of human life, and the circumſtances that tend to prolong our exiſtence beyond the ordinary period. We ſhall not here enter again on any of theſe topics, except to give a more ample account of the gradual approaches of natural death, and ſhall then enumerate the cauſes which uſually produce *violent* or *accidental* death, and mention the opinions of ſome of the beſt writers on the *nature* of death.

367 Gradual approach of natural death.

Natural death is, in the preſent ſtate of civilized ſociety, by no means a common occurrence. When it does take place, its approach is ſlow and gradual. He whoſe life terminates in conſequence of advanced age, (to uſe the language of a celebrated French phyſiologiſt), dies in detail. His external functions ſucceſſively ceaſe to exert their action; all his ſenſes are ſucceſſively loſt, or the ordinary cauſes of ſenſation paſs over them without leaving their uſual impreſſions. The *ſight* becomes obſcure, and at length the humours of the eye no longer tranſmit the rays of light; the *ear* receives only confuſed ſounds, and frequently before death, is altogether inſenſible; the ſenſe of *touch*, in conſequence of the hardneſs and callouſneſs of the cuticle, and the obliteration of many of the ſubcutaneous veſſels, grows dull and uncertain; and all the parts depending on the ſkin ſhow marks of weakneſs; the hair and the beard grow white, and a greater or leſs degree of baldneſs takes place; odours are no longer perceived, or they are perceived but faintly. The taſte uſually ſurvives the reſt of the ſenſes; but that too, at laſt, grows equally obſcure. The functions of the brain partake of the imbecility of the external ſenſes. The imagination in particular becomes dull and often depraved; the memory no longer retains thoſe occurrences which are every day taking place, though it recalls with increaſed reliſh and delight thoſe of paſt times; the judgement becomes weak and wavering.

From the univerſal agency exerted by the nervous ſyſtem on all the animal functions, we muſt expect that when the former is impaired, the latter will be proportionally enfeebled. The faculties of locomotion and of ſpeech are commonly the firſt of theſe that fail; the body totters at every ſtep, the voice grows weak, and the tongue faulters. The motion of the limbs is difficult and painful, and hence is but ſeldom willingly exerted. Not ſo with the vocal organs, though the impediments to utterance are evident and painful to his hearers, the old man himſelf ſeems ſcarcely to attend to them, but talks with proverbial garulity, and eſpecially delights in recounting the ſcenes and actions of his youth.

While the external functions, and thoſe of the brain, are thus gradually impaired; the internal, or what are commonly called the vital and natural functions, as digeſtion, abſorption, circulation, reſpiration, and ſecretion, proceed with but little derangement. The circulation and reſpiration are indeed ſlower than before, and the appetite is in general leſs keen and returns leſs frequently; but the digeſtive powers of the gaſtric fluids remain in full vigour; and even after death has taken place, are exerted on the coats of the ſtomach; abſorption is alſo very active, and nutrition, at leaſt in many parts of the body, is ſufficiently evident. At length, however, all theſe functions loſe their powers; digeſtion languiſhes; the ſecretions no longer take place; the circulation, eſpecially in the minute veſſels, becomes obſcure, and being deprived of the tonic powers by which it was carried on, gradually ceaſes altogether; the heart no longer propells the blood from its ventricles; and the circulation through the lungs being thus arreſted, theſe organs ceaſe to take in air, make their laſt expiration, and thus the natural life of man is terminated *.

368 Accidental or violent death.

Accidental death takes place in one of the two following ways; either ſuddenly, in conſequence of ſome great diſturbance produced in the animal economy, as when a man is cut off by a ſudden ſtroke of apoplexy, violent hæmorrhage, *aſphyxia*, &c. or by ſlow and gradual ſteps, in conſequence of ſome leſs violent but ſtill fatal diſeaſe. In the former caſe, it is *ſudden* or *violent* death; in the latter *lingering* death.

Violent death may take place firſt, either in the *brain*, the *lungs*, or the *heart*; but when the action of one of theſe organs ceaſes, that of the others ſoon terminates. The entire ceſſation of life ſeems, however, to be more ſudden in the two latter caſes, and moſt of all in the laſt; when the *heart* is wounded or ruptured, the animal dies inſtantly; when the lungs are rendered inactive in conſequence of ſuffocation, the animal may live for ſeveral minutes, or for an hour or two; but when the *brain* is overwhelmed, he may ſurvive for hours or even days. Thus it ſometimes happens, in caſes of apoplexy, that the patient lies motionleſs, ſpeechleſs, and quite inſenſible to external ſtimuli, while the circulation and reſpiration continue, impeded indeed, but not deſtroyed, for a conſiderable time, though life, as appears from the event, be in a ſtate of irrecoverable declenſion. We ſhall preſently ſhow how theſe circumſtances have been explained.

The uſual ſigns of approaching death are, a very quick and ſmall pulſe, ſcarcely diſtinguiſhable, and commonly intermitting; coldneſs, and generally clammy ſweats about the extremities; a "lack luſtre" eye, ſunk in features, want of expreſſion about the countenance, and a prominence of the bones of the face, with a correſponding hollowneſs in the cheeks, orbits, and eſpecially

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* See *Bichat Recherches Phyſiol.* part i. art. 10.

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Signs of approaching death.

eſpecially at the temples. Theſe laſt appearances conſtitute the marks of what has been called *facies Hippocratica*. They are all ſigns of a loſs of activity and power in the circulating and nervous ſyſtems. Under theſe bodily circumſtances, the powers of the mind ſeem to decline, generally with an equal pace with thoſe of the body; and when the medium through which the activity of the ſoul is manifeſted can no longer act, we cannot expect to find any further traces even of its exiſtence. Yet at the period of its ſeparation, we are told of brilliant mental exertions of powers of intellect, not equalled in the beſt portion of exiſtence. It has not been our fortune to ſee ſuch intellectual animation. At the moment of death, anxiety for thoſe we have loved will ſometimes occaſion apparently diſproportioned exertions; and as they were unexpected, they have been exaggerated. But in no inſtance could we ever detect the activity of mind independent of the body. To this temporary priſon the ſoul is confined, till, by the deſtruction of the machine, its animating principle is emancipated, ſoaring probably in higher, and, we truſt, in more bliſsful, regions *.

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Signs or criterion of actual death.

A few caſes have occurred, in which perſons, who were thought dead, have recovered from what was really a ſtate of *ſuſpended animation*; and there is reaſon to believe, that ſome unhappy beings have been buried while in this ſeemingly lifeleſs ſtate. It becomes, therefore, a matter of the higheſt importance to aſcertain, with certainty, whether or not death has actually taken place. The ordinary ſigns of death, as enumerated by one of the lateſt writers on this ſubject, are as follow:

1. The *ſuſpenſion of reſpiration*. 2. The *rigidity* of the limbs. 3. The *loſs of ſenſation* and *motion*. 4. The *want of pulſation* in the heart and arteries. 5. The *ſpontaneous diſcharge of fæces*. 6. The *collapſe*, *opacity*, and *want of luſtre* in the *eyes*. 7. The *coldneſs* of the body. 8. The *paleneſs* or *lividity* of the countenance. 9. The *relaxation* of the lower *jaw*. 10. The *regurgitation of liquids* to the mouth. 11. The *inſenſibility* of the *pituitary membrane* of the *noſe*. 12. The *collapſe*, *ſoftneſs*, and *wrinkling* of the *lips*. 13. The *hollowneſs* of the *temples*, and *thinneſs* and *contraction* of the *noſe*. 14. *Putrefaction* †.

Moſt of theſe ſigns ſingly have been ſhown to be fallacious; and none of them, except the laſt, are to be depended on with implicit confidence. Dr Davis recommends the following mode of procedure. "As ſoon as the evident ſigns of life ceaſe, let us place the body in a warm or dry bed, give a proper temperature to the air of the apartment, and employ every means for reſtoring it to life. If we judge, from the nature of the diſeaſe which preceded the death, that theſe means are uſeleſs, we may content ourſelves with keeping the body, until its decompoſition become manifeſt; but let us never abandon an unfortunate perſon, who, perhaps, by perſeverance in the proper means, may be reſtored to life: ſhould he recover, he will be a living monument of unexpected reſurrection, and of the unceaſing efforts of humanity. If a perſon die of malignant fever, ſcurvy, internal inflammation, or any other diſeaſe which corrupts the fluids, ſoon after death the belly becomes black and ſwelled; black or livid ſpots appear on the limbs and back, the eyes become hollow and ſoft, and diſcharge a puriform fluid: the eyelids grow yellow; the mouth opens, becauſe the lower jaw is relaxed; the ſkin gets ſoft, the muſcles flaccid; and, laſtly, the whole body exhales a putrid odour. All theſe phenomena united, conſtitute an infallible proof of real death *, (S)."

The changes which the animal body undergoes in conſequence of death, and during putrefaction, have been amply detailed and explained under CHEMISTRY, chap. xix. ſect. 2.

371
Comparative pertinacity of life.

In treating of the general phenomena of life in the firſt chapter of this article, we made a few obſervations on the degree of vitality that appears in various tribes of organized beings. There is ſcarcely a more curious part of the phyſiology of death than the conſideration of the greater or leſs difficulty with which it is produced in different animals. Some, as the herring and the whiting, die almoſt inſtantly on being removed from the ſituation in which they uſually live. Some are killed by a ſlight blow on the nape of the neck; this is the caſe with the ſeal, the rat, the hare, and the rabbit. Others again retain life with great pertinacity. Among the mammalia, the cat is proverbial for being difficult to kill; the ſloth has been known to live for above 40 days clinging to a pole, and entirely without food; and Dr Sparrman aſſures us, that the ratel, or honey weazle (*viverra mellivora*), is ſo hardy that it is almoſt impoſſible to kill it; the coloniſts and Hottentots both aſſert, ſays he, that it is almoſt impoſſible to kill this creature, without giving it a great number of violent blows on the noſe; and it is remarkable that ſuch a number of hounds as are able collectively to tear in pieces a lion of moderate ſize, are ſometimes obliged to leave the ratel only apparently dead †. Some fiſhes live for a long time after being removed from the water, and even after being gutted and cut in pieces, as the *carp*, the *flounder*, and the *eel*. It is among the reptiles, molluſca, and zoophytes, however, that we find the moſt remarkable inſtances of pertinacity of life. Referring the reader to the article ERPETOLOGY for theſe inſtances in reptiles, and to HELMINTHOLOGY for thoſe in zoophytes, we ſhall here only mention two among molluſca. The ſea marigold (*actinia calendula*) is deſtroyed with ſuch difficulty, that after drilling the holes of the rock from which they appear, with an iron inſtrument, they have been known to riſe again in the ſame places, and become as numerous as before in the courſe of a few weeks ‡. Snails whoſe remarkable ſuſpended animation we have already recorded, may be cruſhed beneath the foot, and will yet ſurvive, and repair the breaches in their ſhelly covering; nay, they are capable of paſſing the ordeal of boiling water, as we learn from the relation of a lady who, wanting ſome ſnail ſhells for a piece of grotto work, attempted to kill the animals by repeatedly pouring over them boiling water; but to her horror and aſtoniſhment, ſhe obſerved them next day crawling about the edges of the veſſel in

* New Lond. Med. Dict. vol. ii. p. 534.

† Davis Reglement concernant les decès, part ii.

* Ibid.

† Sparrman's Voyage.

‡ [illegible]

(S) The work of M. Bruhier, *ſur l'Incertitude des Signes de la Mort*, from which theſe remarks of Dr Davis appear chiefly to be taken, created ſo much alarm in France, that every body dreaded being buried alive. To combat theſe terrors, M. Louis, in 1752 publiſhed his *Lettres ſur la Certitude des Signes de la Mort*; in which he has very happily, and we think ſucceſsfully, refuted the arguments of Bruhier, and has thereby relieved the minds of his readers from one of the moſt dreadful apprehenſions that can appal us on this ſide the grave.

Of Death.

in which ſhe had folded them *. It is in vain for us to attempt any explanation of theſe extraordinary phenomena. We muſt refer them to ſome principle in the animal economy which is at preſent unknown.

* *Annual Regiſter*, vol xvii. p 86.

372 Cauſes of death.

The remote cauſes of death have been, by Dr Ontyd, arranged under 12 general heads, to which he gives the name of *claſſes*. Theſe we ſhall enumerate, with their principal ſubdiviſions.

I. Death ariſing from the mechaniſm of the body.

II. Death from the paſſions of the mind.
 1. *Exciting paſſions*; 2. *Depreſſing paſſions*.

III. Death from ſuperabundance or deficiency of heat.
 1. *From ſuperabundant heat*; 2. *From deficient heat*.

IV. Death from electricity.

V. Death from noxious gaſes.
 1. *From hyperoxygenated gaſes*; 2. *From deoxygenized gaſes*; 3. *From peculiarly ſtimulating gaſes*.

VI. Death from poiſons.
 1. *Animal poiſons*; 2. *Vegetable poiſons*; 3. *Mineral poiſons*.

VII. Death from univerſal diſeaſe.
 1. *Fevers*; 2 *Febrile diſeaſes* (exanthemata).

Theſe ſeven claſſes are ſuppoſed to produce death by the immediate extinction of the *vital principle*; the five following are ſuppoſed to effect this by ſuppreſſing the action of ſome vital organ, or by diſordering the chain of the vital powers by deſtroying the action of ſome of the intermediate links.

VIII. Death from inflammations.
 1. *Inflammations of the head*; 2. *Of the breaſt*; 3. *Of the belly*.

IX. Death from fluxes.
 1. *Mucous fluxes*; 2. *Hemorrhages*.

X. Death from cachexies.
 1. *Ulcers*; 2. *Atrophies*; 3. *Debilities and Privations*.

XI. Death from diſeaſes of the nervous ſyſtem.
 1. *Atony*; 2. *Spaſm*.

XII. Death from diſeaſes of the ſecretory organs.
 1. *From altered action*; 2. *From altered ſtructure* *.

* *Ontyd on Mortal Diſeaſes.*

373 How theſe operate.

The manner in which theſe cauſes operate in terminating life, is thus ſtated by the ſame author.

The cauſes of the *firſt claſs* act by inducing too great a rigidity of the ſolids, and by rendering them inſenſible to *ſtimuli*; the neceſſary effects of the continued action of the powers of *life*. In death from cauſes of the *ſecond claſs*, the perſon dies in conſequence of *apoplexy*, *ſyncope*, or *ſuffocation*, the brain, the heart, or the lungs being overwhelmed by accumulated blood. The cauſes of the *third claſs* act in a ſimilar manner with thoſe of the ſecond; that of the *fourth* by ſuddenly extinguiſhing the *vital principle*; thoſe of the *fifth* always act by inducing *ſuffocation*. The cauſes of the *ſixth* claſs act in *four* ways: 1. By aboliſhing the vital principle by the violence of their ſtimulus; 2. By deſtroying the action of the brain, the heart, or the lungs; 3. By producing mortification of the inteſtinal canal; 4. By ſecretly and inſenſibly deſtroying life. Thoſe of the *ſeventh* claſs act in *ſix* ways: 1. and 2. As in the laſt; 3. By local inflammation; 4. By *mortification* of ſome *vital organ*; 5. By a change in the organic ſtructure of the inteſtinal canal inducing a colliquative *diarrhœa*; 6. By *colliquative ſweats* waſting the body.

The cauſes of the *eighth* claſs act in *four* ways: 1. By inducing violent convulſions; 2. As in the two laſt; 3. By ſuppreſſing the action of ſome vital function from the violence of the inflammation; 4. By mortification. The *ninth* claſs may act in *five* modes: 1. By *ſpaſm*; 2. By local *ſyncope*; 3. By impeded action of ſome vital organ; 4. By mortification or *ſphacelus*; 5. By waſting the ſtrength in *frantic exertions*. The *tenth* claſs may act in no leſs than *nine* ways: 1. By the conſumption of ſome vital organ, or deſtroying the tone of the whole body; 2. By the violence of the noxious ſtimulus; 3. By ſuffocation; 4. By apoplexy; 5. By *ſyncope*; 6. By hemorrhage; 7. By colliquative *diarrhœa*; 8. By mortification of ſome organ; 9. By malignant fever from abſorbed ichorous matter. The cauſes of the *eleventh* claſs act only in two ways: 1. By violent ſpaſm; 2. By apoplexy. Thoſe of the *twelfth* claſs, produce death in three modes: 1. By the ſlow effects of the noxious ſtimulus; 2. By the continually ſtimulating noxious power alone, or by this and the continual waſting of the blood, to form ſome peculiar ſecretion; 3. By impeding or deſtroying the function of a vital organ *.

* *Ontyd*, p. 657.

Many of theſe modes of operation are very ill defined, and they may all be reduced to about eight or ten, or perhaps even fewer.

374 [illegible]

Death has been defined *the ſeparation of the ſoul from the body* †: the *extinction of the vital principle*; the *extinction of the faculty of anſwering a ſtimulus* ‡, &c. &c. Perhaps we cannot deſcribe it better than by calling it *the irrecoverable ceſſation of all the bodily functions*. By this character we diſtinguiſh it from *ſuſpended* animation and *lethargy*, in which *ſome* of the functions continue; while we acknowledge the ſurvival of the *immaterial part* of our frame.

† [illegible]

‡ *Ontyd.*

It has been the general opinion among philoſophers, both of ancient and modern times, that death produces only a change of the elements or principles of the organized body; and does not effect the *annihilation* of any part. Modern chemiſtry has fully confirmed this opinion, and has ſhown that by putrefaction the body is diſſolved into a few *earthy*, *ſaline*, and *gaſeous* products, all capable of entering into new combinations, and thus conſtituting a part of future bodies. See Chemistry, N° 2572, and Man, N° 44.

Of all the writers on the nature and phenomena of death, with whom we are acquainted, none has treated the ſubject with ſuch accuracy and philoſophic method, as Bichat. With a ſummary of ſome of the leading principles of this able phyſiologiſt we ſhall cloſe the preſent chapter, and thus terminate our phyſiological enquiries.

375 Opinions of Bichat.

We have already mentioned Bichat's diviſion of life into *animal* and *organic*: ſee N° 49. Proceeding on the principle of this diviſion, he conceives that the two lives terminate in different ways, and that one often terminates while the other remains active. In the natural death that happens from old age, the *animal life* gradually ceaſes in the order we have deſcribed, N° 367, while the *organic* life remains. The ſame happens in thoſe caſes of violent death where life firſt ceaſes in the brain, this organ being the centre of animal life. In other caſes of violent or accidental death, the *organic* life firſt ceaſes in its central organs, the *heart* or the *lungs*; but in theſe caſes, the *animal* life alſo is ſpeedily ſuppreſſed.

It

[To face page 525. Vol. xvi.]

TABLE
OF THE MOST IMPORTANT CIRCUMSTANCES
RESPECTING THE
ORGANIC FUNCTIONS
OF THE
HUMAN BODY.

	I. SENSATION.	II. MOTION.	III. DIGESTION.	IV. ABSORPTION.	V. CIRCULATION.	VI. RESPIRATION.	VII. SECRETION.	VIII. REPRODUCTION.
1. ORGANS.	*Cerebrum*, *Cerebellum*, *Medulla Oblongata*, Spinal marrow, Nerves, Organs of Senſe.	Muſcles, Tendons, Bones, Cartilages, Ligaments, and Mucous bags.	Salivary glands, Mouth, Teeth, Gullet, Stomach and Inteſtines, Liver, Pancreas, and Spleen.	Lacteals, Lymphatics, Thoracic duct, Meſenteric glands, Lymphatic glands, Skin.	Heart, Arteries, Veins, and Exhalants.	Noſtrils, *Larynx*, Windpipe, Lungs, and *Diaphragm*.	Salivary glands, Liver, *Pancreas*, Kidneys, *Teſtes*, Mucous glands, Membranes, &c. Miliary glands, Brain?	*Penis*, Teſticles, *Veſiculæ Seminales*, Proſtate gland, Spermatic veſſels in Man; *Vulva*, *Vagina*, *Uterus*, and the *Mammæ*, in Woman.
2. FLUIDS.	Lymphatic and Gelatinous fluids, Nervous fluid?	Gelatinous fluid, *Synovia*, Marrow, Lymph, and Blood.	*Saliva*, Gaſtric juice, Pancreatic juice, Bile, *Mucus*.	Chyle, Lymph, Serous fluid.	Blood, Lymph, and various exhaled and ſecreted fluids.	Blood and *Mucus*.	Tears, *Mucus*, *Saliva*, Gaſtric juice, Pancreatic juice, Bile, Lymph, *Synovia*, Fat, Marrow, *Cerumen*, *Semen*, Urine, Milk, Nervous fluid?	*Semen*, Mucous fluid, Proſtatic fluid, *Liquor amnii*, and Milk.
3. PHENOMENA.	Senſation, Action of external bodies on Man, and Perception of theſe Actions.	Contraction, Dilatation, Locomotion, Progreſſion. Action of Man on external objects.	Maſtication, Deglutition, Digeſtion in the ſtomach and inteſtines. Mutual Action of Alimentary ſubſtances and the Digeſtive organs.	Imbibition, Action of the Lymphatic veſſels and glands on the fluids, Separation of noxious or uſeleſs matters, and Selection of uſeful ſubſtances.	Contraction, Dilatation, Pulſation, Exhalation, Nutrition.—Mutual action between the Blood and Circulating fluids.	Purification of the fluids, Renewal of action, Animal heat, Mutual action between the air and the animal ſolids and fluids.	Separation of fluids uſeful in the economy, and Expulſion of noxious or uſeleſs parts.	Copulation, Conception, Parturition, Lactation.
4. POWERS.	Senſibility and Vital reſiſtance.	Irritability, Contractility, and Vital reſiſtance.	Diſſolution, Aſſimilation, and Vital reſiſtance.	Irritability, Contractility, Aſſimilation, and Vital reſiſtance.	Elaſticity, Irritability, Contractility, Dilatability, and Vital reſiſtance.	As in CIRCULATION.	Various.	Generative power.
5. RELATIVE PREDOMINANCE.	Moſt predominant in *infancy*; *female ſex*; *melancholic temperament*; *hypochondriac*, *hysteric*, and other nervous affections, and in warm climates.	In *manhood*; in the *male* ſex; the *ſanguine* temperament, and *mountainous* countries.	In *infancy*; in the *female* ſex; in the *ſanguine* temperament; in cold weather and cold climates.	In *childhood*; in the *ſanguine* temperament; in *warm* climates; and during *ſleep*.	In *childhood*; in the *female* ſex; in the *ſanguine* temperament; in warm countries; and in *febrile* and *inflammatory* affections.	Much as in CIRCULATION.	In middle age; various as to ſex and temperament; in *warm* climates.	In *youth*; in thoſe of a ſanguine temperament, and lively imagination.
6. PRINCIPAL MORBID AFFECTIONS.	*Vertigo*, *Coma*, *Delirium*, Inſanity.—Pain, Itching, Want of feeling; *Ageuſtia*; *Tinnitus aurium*, Deafneſs; Intolerance of light, *Dyſopia*; *Caligo*, *Amauroſis*.	Spaſm, Convulſion, Twitching, *Paralysis*.	*Bulimia*, *Pica*, *Nauſea*, *Flatus*, Eructation, Rumination, Vomiting, Heartburn, *Pyrexia*, *Anorexia*.	Glandular obſtruction, Atony of lymphatics.	General fever, Palpitation, *Pl*[illegible] Inanition, Debility, *Syn*[illegible].	Yawning, Sighing, Sobbing, Hiccup, Sneezing, Coughing, Anxiety, *Dyſpnœa*, *Stertor*, *Aſphyxia*, Dumbneſs.	Increaſed ſecretion, Diminiſhed ſecretion, Depraved ſecretion, Jaundice, *Calculus*, &c.	*Priapiſmus*, *Satyriaſis*, *Nymphomania*, *Menorrhagia*, *Amenorrhœa*, Impotence, Sterility.

Of Death.

It is to violent or accidental death that Bichat principally confines his observations, and in order to determine with precision the phenomena that take place in these three species, he examines at great length the relations that ſubſiſt among the three functions of circulation, reſpiration and [illegible], as they are affected by the death of the heart, the lungs, or the brain. He first considers thoſe caſes of sudden death that commence with the death of the heart; then thoſe beginning in the lungs; and laſtly thoſe originating in the brain. He shows how, one of theſe functions ceaſing, the others ſucceſſively ſtop; he points out the mechaniſm by which the death of all the parts follows that of the organ firſt affected; and he determines, according to his own principles, the nature of the ſeveral diſeaſes by which the life of the heart, the lungs, or the brain, is extinguiſhed *.

* Recherches physiol. art. 1.

We conſider this as the moſt intereſting part of his valuable work, and it well deſerves the attentive peruſal of every medical man. We regret that we cannot do more than extract from it the view given by the author of the ſucceſſive phenomena produced by the influence which the death of each of the vital organs exerts on the general death of the body.

476 Progreſs of death commencing in the heart.

Whenever the heart ceaſes to act, ſays Bichat, general death comes on in the following manner. The action of the brain ceaſes for want of excitation; and from the ſame defect, the ſenſation, locomotion and ſpeech, which immediately depend on the general ſenſorium, are interrupted. Beſides, for want of the excitation of part of the blood, the organs of theſe functions would ceaſe to act, even though the brain were ſuppoſed capable of exerting on them its uſual influence. The whole of the animal life, then, is ſuddenly arreſted. The man, from the moment that his heart dies, ceaſes to exiſt with reſpect to ſurrounding objects.

The interruption of *organic* life, which has commenced through the circulation, operates at the ſame time through the reſpiration. The mechanical actions of the lungs no longer proceed when the brain ceaſes to act, ſince on this organ depends the action of the diaphragm and intercoſtal muſcles. The chemical changes can no longer take place, when the heart can neither receive nor convey the materials neceſſary for their developement. In ſhort, general death continues to proceed in a gradual manner, by the interruption of *ſecretion*, *exhalation*, and *nutrition*. Theſe are the effects produced when death is the conſequence of a wound of the heart or large blood-veſſels, a rupture of the heart, or ſimilar accidents †.

† [illegible] 5.

477 Progreſs of death commencing in the lungs.

The ſeries of phenomena that take place in death, as commencing in the lungs, is different according as the *mechanical* or the chemical action of theſe organs is firſt arreſted. I. In the former caſe, as when death is produced by an extenſive wound or laceration of the diaphragm, by the fracture of a great many ribs at the ſame time, &c. they proceed as follows: 1. Ceſſation of the mechanical action; 2. Ceſſation of the chemical phenomena, for want of the air which ſupported them; 3. Ceſſation of the brain's action, for want of [illegible] by which it was excited; 4. [illegible] of locomotion, and ſpeech, from the [illegible] [illegible] 7. Ceſſation of digeſtion, for want of [illegible], and of excitation of the digeſtive organs. II. When the chemical action of the lungs is interrupted, as when an animal is confined in a *vacuum*; in caſes of *aſphyxia*, [illegible], &c. the phenomena of death proceed in the following order: 1. Interruption of the chemical phenomena; 2. [illegible] in the brain; 3. Ceſſation of ſenſation, voluntary motion, voice, and the mechanical functions of reſpiration; 4. Stoppage of the heart's action, and of the general circulation; 5. Termination of the capillary circulation, of ſecretion, exhalation, abſorption, and, by conſequence, of digeſtion; 6. Ceſſation of animal heat, which, being the reſult of all the functions, muſt ceaſe when all theſe are terminated †.

† [illegible]

478 Progreſs of death commencing in the brain.

The phenomena of general death commencing in the brain come on in the following ſeries. 1. Ceſſation of the brain's action; 2. Sudden interruption of ſenſation and voluntary motion; 3. Simultaneous paralyſis of the diaphragm, and intercoſtal muſcles; 4. Interruption of the mechanical phenomena of reſpiration, and, by conſequence of voice; 5. Ceſſation of the chemical phenomena; 6. Paſſage of the *black* blood into the ſyſtem of *red* blood; 7. Impeded circulation, from the action of the black blood on the heart and arteries, and from the immobility of all the parts, eſpecially the organs of the cheſt; 8. Death of the heart, and ſtoppage of the general circulation; 9. Simultaneous interruption of organic life, eſpecially in the parts that are uſually penetrated by red blood; 10. Extinction of animal heat ‡.

‡ [illegible]

Concluſion.

We have now gone through the ſeries of physiological enquiries, into which we propoſed to enter in this article. In forming an eſtimate of the merit due to our labours, we requeſt that our readers will conſider the article as in a great meaſure ſupplemental to many that have preceded it in the courſe of the preſent work. It has been our principal object to fill up blanks and ſupply deficiencies, eſpecially with reſpect to *Comparative Phyſiology*, and to form, with thoſe preceding articles which have a reference to the *animal economy*, particularly ANATOMY, MEDICINE, MIDWIFERY, CHEMISTRY, MAN, one *connected*, if not *uniform* whole. The difficulty of the taſk we had undertaken will probably be admitted as ſome [illegible] of it; while the variety and intereſting nature of the ſubjects which we have treated, with the numerous references to the moſt reſpectable ſources of information, will, we truſt, render this article acceptable both to the general and the ſcientific reader.

EXPLANATION OF PLATE CCCCXVIII.

Fig. 1. *Exhibits a view of the exit from the head, and distribution in the cheſt of the great ſympathetic nerve, intended to illuſtrate the natural relations between the head and the principal organs of the cheſt and belly.*

A. The right *parotid gland* [illegible].

B. The [illegible].

C, D, E. The *digaſtric muſcle*, partly covered by the *ſubmaxillary gland.*

F.

F. Part of the *thyroid gland.*

G, G. The *œſophagus* or gullet.

H, H. The wind-pipe or *trachea.*

II. III. IV. V. VI. VII. The bodies of the ſix lower *vertebræ* of the neck; VIII. IX. the two firſt vertebræ of the back.

I, K, L. The heart, with part of the pericardium attached.

p, p. The arch of the aorta, drawn aſide.

q. The common trunk of the right ſubclavian (*r*) and right carotid (*v*) arteries.

P. The *vena cava* from the *ſuperior* parts; Q. That from below.

R, S, T. The right lobe of the lungs.

U, V. Part of the left lobe.

W, X, Z. Muſcular parts of the *diaphragm.*

a. The firſt cervical or great *ganglion*, from which proceed, *b.* The trunk of the great ſympathetic nerve, and *c.* The eighth pair of nerves, or *par vagum.*

d. The lower cervical *ganglion*, oppoſite the fifth cervical *vertebra.*

e. The upper thoracic *ganglion*, oppoſite the firſt vertebra of the back.

f. The third dorſal *ganglion*, between the ſecond and third rib.

g. The *acceſſory nerve* of Willis.

h, i, k, l. Trunks of ſome of the cervical nerves.

m. The *cardiac plexus* formed by branches from the ſympathetic nerve.

n, n. The *par vagum* running down to the *diaphragm*, through which it paſſes, unites with the *intercoſtal*, forms various *ganglia*, and gives branches to moſt of the abdominal *viſcera.*

o, o. The *phrenic* nerves diſtributed to the *diaphragm.*

Fig. 2. A ſection of the cuticle of the *lilium chalcedonicum*, to ſhew the *lymphatic veſſels*, much magnified.

Fig. 3. A ſimilar magnified view in the *onion.*

Fig. 4. Ditto in the *pink.*

Fig. 5. Repreſents the atlantal extremity of the ſlow lemur (*lemur tardigradus*), to ſhow the curious diviſion of the *ſubclavian* artery.

a. The ſubclavian artery, lying upon the *ſubſcapularis* muſcle.

b. The diviſion of the artery into equal-ſized cylinders.

c. The ulnar artery proceeding to divide in the uſual manner.

Fig. 6. Repreſents the ſacral extremities of the ſame animal, ſhowing a ſimilar diviſion of the inguinal artery.

a. The *diaphragm.*

b. The deſcending *aorta.*

c, c. The iliac *arteries.*

d. The trunk of the *inguinal* artery, ſituated among the cylinders.

e. The femoral artery under ſimilar circumſtances.

The annexed Table ſufficiently explains itſelf.

ERRATA.

Page 501. *col.* 2. *line* 25. *from the top*, *for* the circulation, *read*, the leſſer circulation. N°. 360. *for* chryſolites, *read*, chryſalids.

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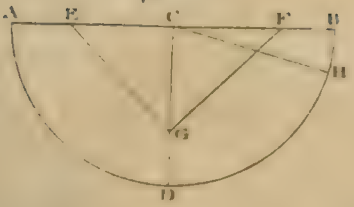
Fig. 1.



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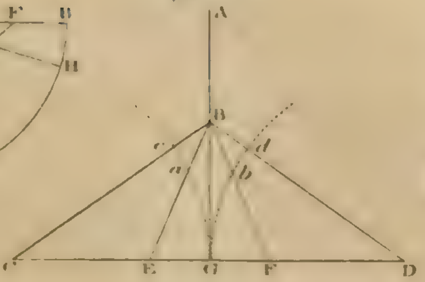

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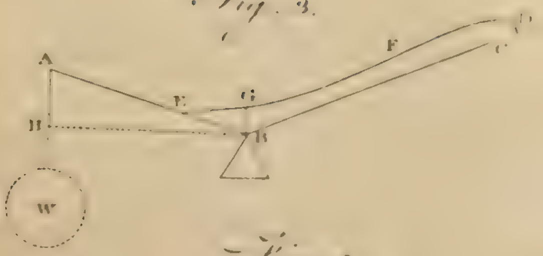

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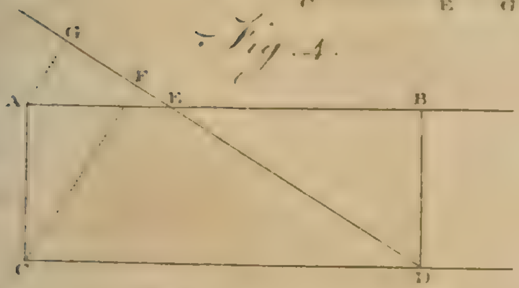

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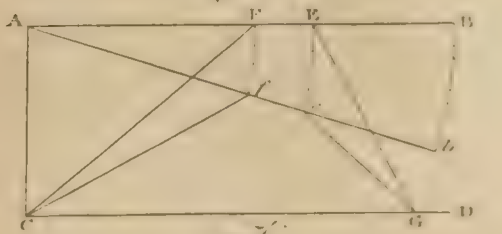

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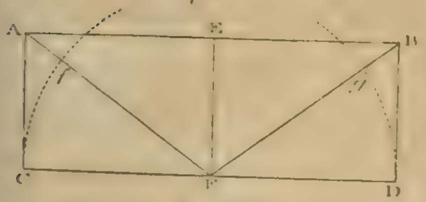

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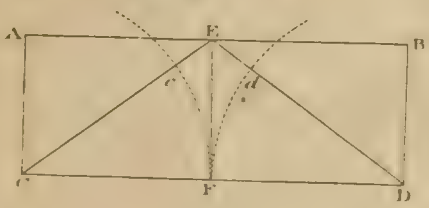

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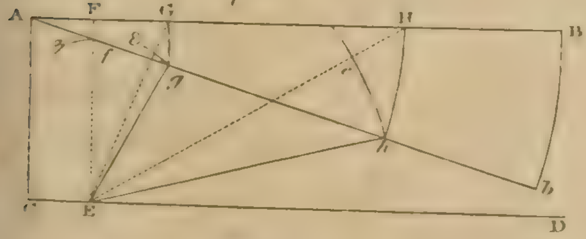

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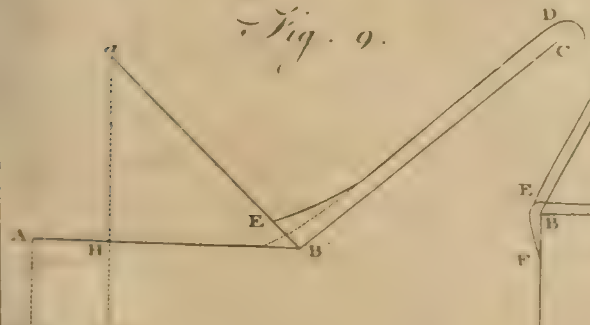

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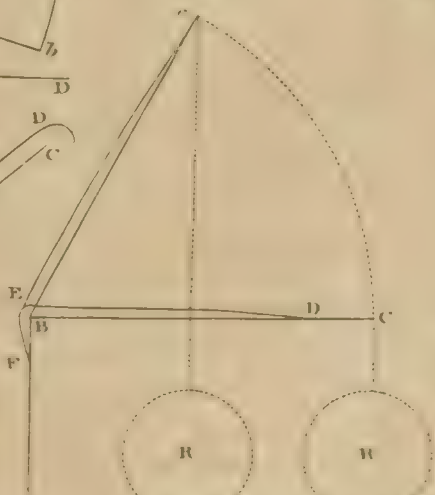

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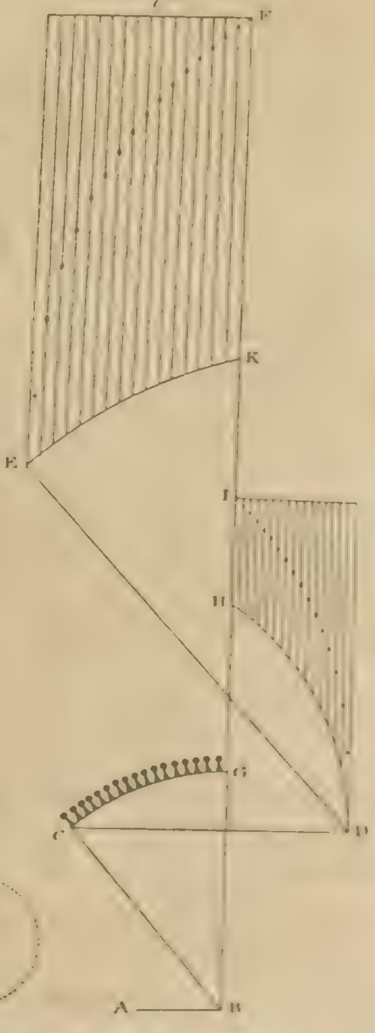
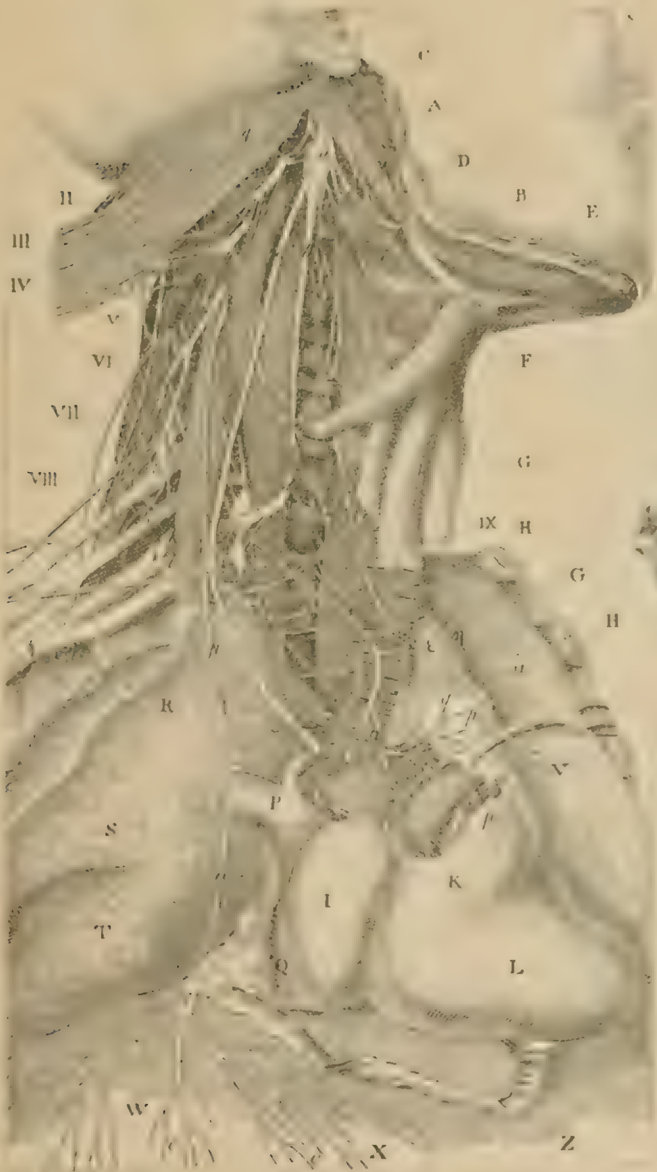


A. Bell Prin. Wal. Sculptor fecit

Fig 1



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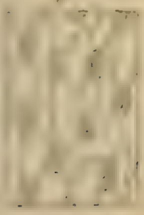

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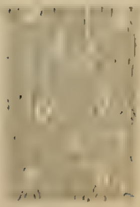

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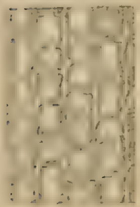

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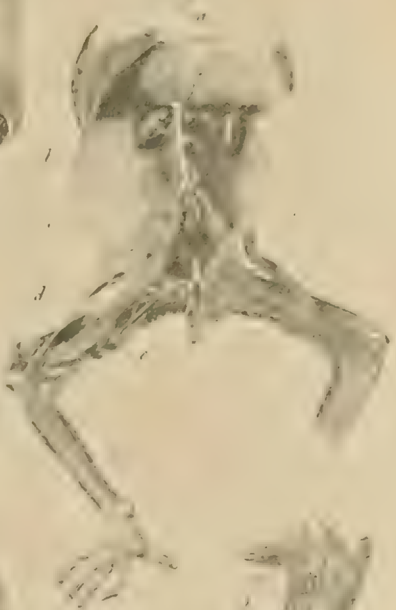
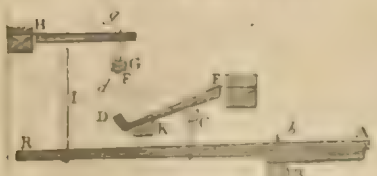


Fig 5

PIANO FORTE KEY



PHYTOLACCA, POKEWEED, or *American Nightſhade*, a genus of plants belonging to the decandria claſs. See BOTANY *Index*.

PHYTOLOGY, a diſcourſe concerning the growth, kind, and virtues of plants. See BOTANY, and MATERIA MEDICA.

PHYTON, a general of the people of Rhegium againſt Dionyſius, the tyrant of Sicily. He was taken by the enemy, and tortured, and his ſon was thrown into the ſea. See SYRACUSE.

PIA MATER, a thin membrane which covers the brain and is in immediate contact with it. See ANATOMY *Index*.

PIABA, in *Ichthyology*, is a ſmall freſh-water fiſh caught in all the rivers and brooks in the Braſils, and in ſome other parts in America. It is about the ſize of the common minow.

PIABUCU, in *Ichthyology*, is an American fiſh, eaten in many places by the natives. It is ſaid to be ſo ravenous, and greedy of blood, that if a perſon go into the water with a wound in any part of his body, the piabucu will make up to it to ſuck the blood. It ſeldom exceeds four inches in length.

PIACENZA is a city of Italy, in the duchy of Parma, in E. Long. 10. 25. N. Lat. 45. It is a large handſome city, whoſe name is derived by ſome from its pleaſant ſituation, in a fruitful plain, on the Via Æmilia, about half a mile from the Po. It is the ſee of a biſhop ſuffragan of Bologna, and has a univerſity, but of no great fame. It is defended by a wall and a ſtrong citadel, and is reckoned about three miles in circumference, ſo that it is ſomewhat bigger than Parma. The houſes are low, but well built; the great ſtreet called the *Stradone* is in a direct line and of equal breadth, with a foot-way fenced with poſts on each ſide like London, and is about 3000 feet long. The houſes are generally built of brick, and ſome of them are prettily painted. The cathedral is an old ſtructure, but well adorned within. The duke of Parma, who is ſovereign of Piacenza, has a palace in the city built by Vignola. There are many excellent paintings in this place. There are two chapels painted, one with the hiſtory of St Catharine, and the other with a picture of Chriſt, as alſo the altar of the church of St Auguſtin, all by Pordenone. In the ſame church there is a fine picture of the bleſſed virgin, St Peter, and St Paul, by Paolo Veroneſe. At the Capuchins there is a Francis by Guercino. There is a fountain ſaid to have been erected here by Julius Cæſar, and the equeſtrian ſtatues of the famous general Alexander I. duke of Parma and Placentia, and of his ſon Ranuccio, both in the great ſquare. In the palace of Scotti, there are a great many fine pictures by Laufranco, who had been a page in their family, and among the reſt the rape of Helen, the taking of Troy, the bleſſed virgin, and St Francis. The trade of this city conſiſts chiefly in their cheeſe, as at Parma, theſe cities being ſurrounded with the richeſt paſture grounds in Italy; though the greateſt part of what is called Parmeſan cheeſe is made in the duchy of Milan, and particularly at Lodi. See *Parmeſan* CHEESE.—Without the walls, which are waſhed by the rivers Trebbia and Po, there is a large ſeminary or college, magnificently erected by Cardinal Alberoni, a native of this city, but conſiderably hurt by the modern Goths in the laſt war. Towards the north of the city is the mouth of the river Trebbia, famous for the victory which Hannibal obtained over the Romans.

PIANO FORTE, or FORTE PIANO, is a muſical inſtrument, which is too well known to require any detailed deſcription. We ſhall here, however, notice ſome of its peculiarities. The voice, it has been obſerved, is the original muſical inſtrument; of this all other inſtruments are to be conſidered but as imitations; and it is remarkable with what promptitude, as well as accuracy, the voice of man obeys the impulſe of the heart. Even a coarſe ear is hurt by an error in its tone, amounting to what is called a *comma*; and a limited voice can execute melodies which include 12 notes, or an octave and a fifth. Between theſe extremes the motion of the glottis does not amount to one-twelfth of an inch, which muſt therefore be divided by the moſt ordinary finger into more than 1000 parts. All this too, without any ſeeming effort of thought, is done in an inſtant, and repeated with rapidity, without miſtaking one of the diviſions.

The great object in the conſtruction of muſical inſtruments is, to bring them as near as poſſible to expreſs the ſounds produced by the human voice: the violin, however, and a few of the ſimple wind inſtruments, are the only ones found fully to expreſs thoſe momentary gradations of ſentiment, and thoſe tender and delicate emotions with which the heart is agitated. For the purpoſe of removing this defect of harmonic inſtruments, the ſwell was added to the organ. Similar improvements were alſo attempted on other inſtruments of the ſame kind, and in the ſame way. The harpſichord was ſhut up like the ſwell organ, and was opened by means of pedals, when the performer wiſhed to enforce the ſound. But as this was found not to ſucceed well, other methods were tried, and in particular uniſons were added to each note, which were brought on, either by means of pedals, or by another ſet of keys; and in this way the power of the harpſichord was greatly improved. Among all the keyed inſtruments, the Engliſh piano forte ſeems to merit the preference, on account of the ſuperior force of tone, adequate ſweetneſs, and great variety of voice, of which, by the ingenuity of Britiſh artiſts, it has now become ſuſceptible. It has been called a national inſtrument, becauſe it is ſaid to be an Engliſh contrivance, the invention of the celebrated poet, Maſon. Mr Maſon had ſeen ſome attempts that were made by the Germans to make keyed dulcimers, which were in ſome meaſure ſuſceptible of the *forte* and *piano*; but as they were all conſtructed on one principle, and required a particular touch of the finger, which was of difficult acquiſition, and which ſpoiled it for harpſichord practice; as they were alſo deficient in delicacy and juſtneſs; and as the performer was by no means certain of producing the very ſtrength of ſound intended, Mr Maſon removed all thoſe imperfections, by detaching the mallet entirely from the key, and giving them only a momentary connection. [illegible] by this improvement [illegible] diſtinguiſhed [illegible]

Piano Forte.

The dot F repreſents a ſection of the ſtring. ED is the mallet, having a hinge of vellum, by which it is attached to the upper ſurface of the bar E. At the other end is the head D, of wood, covered with ſome folds of prepared leather. The mallet lies in the poſition repreſented in the figure, its lower end reſting on a cuſhion-bar K, which lies horizontally under the whole row of mallets. The key AR has a pin C, tipt with a bit of the ſofteſt cork or buckſkin. This reaches to within [illegible]th of an inch of the ſhank of the mallet, but muſt not touch it. The diſtance E e is about $\frac{1}{3}$d or $\frac{1}{4}$th of the length of the ſhank. When the end A of the key is preſſed down on the ſtuffing (two or three thickneſſes of the moſt elaſtic woollen liſt) it raiſes the mallet, by means of the pin C, to the horizontal poſition E *d*, within $\frac{1}{5}$th or [illegible]th of an inch of the wire F; but it cannot be ſo much preſſed down as to make the mallet touch the wire. At the ſame time that the key raiſes the mallet by means of the pin C, it alſo lifts off the damper G (a bit of ſpunge) from the wire. This damper is fixed on the end of a little wooden pin G *g*, connected with the lever *g* H, which has a vellum hinge at H. This motion of the damper is cauſed by the pin I, which is fixed into the key near to R. Theſe pieces are ſo adjuſted, that the firſt touch of the key lifts the damper, and, immediately after, the pin C acts on the ſhank of the mallet. As it acts ſo near to its centre of motion, it cauſes the head D to move briſkly through a conſiderable arch D *d*. Being made extremely moveable, and very light, it is thus *toſſed* beyond the horizontal poſition E *d*, and it ſtrikes the wire F, which is now at liberty to vibrate up and down, by the previous removal of the damper G. Having made its ſtroke, the mallet falls down again, and reſts on the ſoft ſubſtance on the pin C. It is of eſſential importance that this mallet be extremely light. Were it heavy, it would have ſo much force, after rebounding from the wire, that it would rebound from the pin C, and again ſtrike the wire. For it will be recollected, that the key is, at this time, down, and the pin C raiſed as high as poſſible, ſo that there is very little room for this rebound. Leſſening the momentum of the mallet by making it very light, making the cuſhion on the top of the pin C very ſoft, and great preciſion in the ſhape and figure of all the parts, are the only ſecurities againſt the diſagreeable rattling which theſe rebounds would occaſion. In reſpect to the ſolidity and preciſion of workmanſhip, the Britiſh inſtruments are unrivalled, and vaſt numbers of them have been ſent to all parts of the continent.

As the blow of ſo light a mallet cannot bring much ſound from a wire, it has always been found neceſſary to have two ſtrings for each note. Another circumſtance contributes to enfeeble the ſound. The mechaniſm neceſſary for producing it makes it almoſt impoſſible to give any conſiderable extent to the belly or ſound board of the inſtrument. There is ſeldom any more of it than what occupies the ſpace between the tuning pins and the bridge. This is the more to be regretted, becauſe the baſſes are commonly covered ſtrings, that they may be of a moderate length. The baſs notes are alſo of braſs, which has a conſiderably lower tone than a ſteel wire of the ſame diameter and tenſion. Yet even this ſubſtitution for ſteel in the baſs ſtrings is not enough. The higheſt of them are much too ſlack, and the loweſt ones muſt be loaded, to compenſate for want of length. This greatly diminiſhes the fullneſs, and ſtill more the mellowneſs and diſtinctneſs of the tone, and frequently makes the very loweſt notes hardly appreciable. This inequality of tone about the middle of the inſtrument is ſomewhat diminiſhed by conſtructing the inſtrument with two bridges; one for the ſteel, and the other for the braſs wires. But ſtill the baſs notes are very much inferior to the treble.

Piano Forte, Piaſtus.

PIASTUS, a native of Poland, was originally a wheelwright and the ſon of Coſiſco, a citizen of Cruſwitz. He flouriſhed in the year 830, when on the extinction of the family of Popiel great diſputes aroſe about his ſucceſſor, and Cracow was afflicted with a ſevere famine. During this extremity, when the people were dropping down in the ſtreets, two angels in human forms, as the ſtory is told, took up their reſidence with Piaſtus, who was celebrated for his piety and extenſive charity. He had nothing left but a ſmall caſk of the common liquor of the country, and this he preſented to his new gueſts, who, charmed with his hoſpitality, promiſed him the crown of Poland. The faith of Piaſtus was equal to his other virtues: he implicitly believed the word of his gueſts, and piouſly followed their directions in every particular. He was ordered to diſtribute the liquor out of his little caſk to the multitude: he did ſo, and found that it was inexhauſtible. The people were aſtoniſhed; all cried out, "A miracle!" and the electors determined to chuſe a perſon in whoſe favour Heaven had ſo viſibly declared: Piaſtus was accordingly taken from his ſhop, and raiſed to the ducal dignity.

Mod. Univ. Hiſtory, vol. xxx. p. 336, &c.

Such is the relation of the canon of Cracow, which differs in many particulars from the account given by Guagnini, and ſeveral other hiſtorians. According to them, Piaſtus had prepared a ſmall collation, to entertain ſome friends who were aſſembled at the birth of a child. Two pilgrims, Paul and John, afterwards murdered at Rome, came about this time to Cracow. They begged charity at the door of the election-hall, and were rudely repulſed; upon which they ſtumbled on the houſe of Piaſtus, and were kindly received. The miracle we have mentioned was wrought by them; and the two pilgrims, and not angels, were the inſtruments of the elevation of the hoſpitable wheelwright. Though we pay but little regard to the marvellous means by which Piaſtus aſcended the ducal throne of Poland, it would be preſumptuous entirely to omit a fact atteſted by all the writers upon this ſubject: it was proper, therefore, to take notice of it, and we leave the reſt to the reader's judgement.

Being now raiſed to the ſupreme dignity, he was not intoxicated with his proſperity. His natural charity, benevolence, and ſweetneſs of diſpoſition, remained: nothing was altered but his power of doing good. He was truly called the father of his people: the injured never returned unredreſſed, nor merit unrewarded. Piaſtus wiped the tear from the eyes of the widow; and was himſelf the guardian of the orphan, and the general patron of the poor and diſtreſſed. His excellent inclinations ſerved him in the room of great abilities; and the happineſs that his people enjoyed made them forget that their prince was not born a ſtateſmen and a warrior. Several inteſtine commotions aroſe during his adminiſtration, all which he quelled by the mildneſs and clemency of his nature: his nobility were aſhamed of rebelling againſt a ſovereign who devoted his whole life to render his people happy. He removed the court from Cruſwitz, a city which he deteſted, becauſe it was the ſcene of Popiel's crimes and tragical end, and fixed his reſidence at Gneſna, where he died beloved, eſteemed, and even adored by his ſubjects.

It is in memory of this excellent prince, that all the natives of Poland, who have been ſince promoted to the ducal or regal dignity, were called Piaſtes, in contradiſtinction to the foreigners.

Piaſtus aſſociated his ſon Ziemovitus with him in the government before his death; a circumſtance of much benefit to the people.

PIAZZA, in *Building*, popularly called *piache*, an Italian name for a portico, or covered walk, ſupported by arches.

The word literally ſignifies a broad open place or ſquare; whence it alſo became applied to the walks or porticoes around them.

PIBROCH, ſays Dr Beattie *, is a ſpecies of tune peculiar I think, to the Highlands and Weſtern iſles of Scotland. It is performed on a bagpipe, and differs totally from all other muſic. Its rythm is ſo irregular, and its notes, eſpecially in the quick movement, ſo mixed and huddled together, that a ſtranger finds it almoſt impoſſible to reconcile his ear to it, ſo as to perceive its modulation. Some of theſe pibrochs, being intended to repreſent a battle, begin with a grave motion reſembling a march, then gradually quicken into the onſet; run off with noiſy confuſion and turbulent rapidity, to imitate the conflict and purſuit; then ſwell into a few flouriſhes of triumphant joy; and perhaps cloſe with the wild and ſlow wailings of a funeral proceſſion.

PICA. See CORVUS, ORNITHOLOGY *Index*.

Pica Marina. See HÆMATOPUS, and ALCA, ORNITHOLOGY *Index*.

PICA, in *Medicine*, a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nouriſhing; as chalk, aſhes, coals, plaſter-lime, &c. See MEDICINE *Index*.

PICA, or *pye*, had formerly the ſame ſenſe as *ordinal*, meaning a table or directory, pointing out the order in which the devotional ſervices appointed for different occaſions were to be performed. Accordingly we are told it is derived from πι, a contraction of πιναξ, *a table*; and by others from *litera picata*, a great black letter at the beginning of ſome new order in the prayer. The term was uſed in a ſimilar ſenſe by officers of civil courts, who called their kalendars or alphabetical catalogues directing to the names and things contained in the rolls and records of their courts the *pies*.

PICA, or *Picus, John*, prince of Mirandola and Concordia, was born in the year 1463, under the pontificate of Pius II. He was the youngeſt ſon of John Francis of Mirandola, and Julia, a lady of the noble family of Boiard. Some of the credulous hiſtorians of the time have related, that at his birth a globe of fire was ſeen to reſt upon his mother's bed, portending, ſay they, by its ſhape the perfection of his genius, and by its element, the celeſtial turn of his mind. As ſoon as he was capable of receiving inſtruction, he was placed by his mother's care under the moſt able maſters, and very early diſtinguiſhed himſelf by the vigour of his application, and the ſtrength of his memory; of which ſuch prodigies are related as would be very difficult to credit, were we not aſſured by ſome modern inſtances, of the perfection to which that faculty may be carried. At the age of fourteen he was ſent by his mother's direction, who was deſirous that he ſhould aſſume the clerical functions, to Bologna, at that time the principal reſort of thoſe who ſtudied the pontifical law. After ſpending two years there, he became diſguſted with this purſuit, although ſuch was his induſtry, even at that early age, that he compiled an epitome of the pontifical epiſtles or decretals. His diſpoſition, however, ſtrongly led him to the purſuit of philoſophy, with an eager curioſity to penetrate the ſecrets of nature and ſcience: with this view he travelled over Italy and France, viſited the moſt celebrated ſchools of each, and ſtudied under the moſt famous teachers of both countries. After ſeven years ſpent in this courſe of inſtruction, and at the age of twenty-three, he went to Rome, and, after the faſhion of the ſcholars of that time, brought himſelf into notice by publicly propoſing literary queſtions for diſputation. This ſort of challenge was very common in that age, and, when printing was ſcarcely practiſed, and the name of a man of learning leſs rapidly extended than it is now, was almoſt the only method that a perſon of ſuperior attainments had to make himſelf known. Mirandola propoſed 900 queſtions, or as they were called *concluſiones*, in dialectics, mathematics, natural philoſophy, and divinity, drawn not only from the Poets of the Latin and Greek, but from the myſteries of the Hebrews and the arcana of the Chaldæans and Arabians. In addition to the endleſs topics of metaphyſics, theology, and the ordinary ſubjects of diſputation, into which he entered very profoundly, the *concluſiones* involved the ancient and obſcure philoſophy of Pythagoras, Triſmegiſtus, and Orpheus; the doctrines of the Cabala, or myſtic interpretation of the ſacred writings, according to the Hebrews, taught by Origen and Hilarius; the extent, uſes, and learning of natural magic, which was vindicated from the vulgar reproach of impiety and necromancy. Seventy-two new phyſical and metaphyſical dogmata of the author's invention were likewiſe propoſed and defended. Theſe propoſitions, according to the oſtentatious practice on theſe occaſions, were fixed in the moſt public places in Rome, and the propoſer engaged to defray the expences of any one who ſhould come from a diſtance for the purpoſe of diſputing with him. This challenge did not bring forward any diſputants, but expoſed Mirandola to much envy and jealouſy, particularly from the profeſſors of ſcience at Rome, who felt the reflection that would be caſt upon their credit by their declining a competition which they durſt not encounter. Unable to injure his fame as a ſcholar, they made a much more dangerous attack upon the foundations of his faith; thirteen queſtions were ſelected, which were charged with the terrible ſuſpicion of hereſy and contempt of the ordinances of the church; a ſuſpicion very readily liſtened to by the church when directed againſt great learning, which the increaſing influence of philoſophy and letters began to make her watch with extreme jealouſy. Mirandola repelled this attack by publiſhing his Apologia, or Defence of the accuſed Propoſitions; which if he did not effectually clear away the ſuſpicions he had incurred, tended to confirm his enemies in their dread of his learning and powers: and it muſt be owned that even he ing the miſapplication of talents to ſuch ſubjects, the Apologia exhibits a command of profound and well digeſted learning and keen argument, truly aſtoniſhing at the age of [illegible]. This work, and the diſcuſſions it contained of certain delicate points, [illegible] to ſome [illegible] of the [illegible] contrad[illegible] in matters of faith, [illegible] to Pope Innocent VIII. [illegible] interdicted the reading both of the Apology and the diſputed queſtions. The love of glory, however, was not Mirandola's only paſſion: his youth, ſplendid accompliſhments, and the graces of his perſon, for which he is ſaid to have been remarkable, attracted the admiration and careſſes of many diſtinguiſhed Roman ladies, who united the love of letters to that of pleaſure, a taſte very common amongſt the Italian ladies of that age. The young philoſopher yielded to the force of theſe allurements, or rather, according to the account of his nephew, and biographer, Franciſco of Mirandola, eagerly followed the bent of his diſpoſition, naturally inclined to obey the attractions of beauty.

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* Eſſay by Dr Beattie, 8vo edit. p. 422. note.

But this life of pleaſure, however ſuitable to his condition and inclinations, was of a ſhort continuance. Irritated by the reſtleſs perſecutions of his enemies, and obliged perpetually to defend himſelf againſt the imputation of hereſy, the moſt formidable calumny which in that age any man could have to contend with, he detached himſelf from vicious pleaſures, and regulated his manner of life by rigidly obſerving the laws of abſtinence impoſed by Chriſtianity; for being a firm adherent to the Chriſtian doctrines, the charge of infidelity and the vigilance of his enemies made him the more ſolicitous to guard againſt the appearance of diſobeying them. Becoming from this time wholly devoted to learning, he ſoon acquired ſuch celebrity that the moſt eminent ſcholars from all parts of Italy came to viſit him for converſation or inſtruction. As a proof of the ſincerity of his reformation, he committed to the flames five books of elegiac poetry which he had compoſed on the ſubject of his amours, together with numerous pieces in Tuſcan verſe, which had been addreſſed to his various miſtreſſes. There is perhaps reaſon to lament that the zeal of a new convert would not be ſatisfied without this ſacrifice. It muſt, however, be conſidered that the ſpirit of religion at that period exacted many ſacrifices from the profeſſors of Chriſtianity, which the lenient temper of theſe times does not call for. An example of this ſeverity is to be met with amongſt the works that ſtill remain of Mirandola; at the end of which, in the folio edition publiſhed by his nephew, we find a learned and entertaining comment, in the Italian language, upon a compoſition of his friend Girolamo Benivieni, entitled *Una Canzona de Amore ſecundo la mente et openione de' Platonici*, "A poetical treatiſe upon love, explaining the doctrines of the Platoniſts." The author, Girolamo, informs the reader, in a ſhort preface, that he had determined to ſuppreſs this poem and comment out of regard to his friend's character and his own; deeming it unbecoming a profeſſor of Chriſtianity, in treating of celeſtial and divine love, "to treat of it as a Platoniſt and not as a Chriſtian;" but that having lent it to ſome of his friends for their peruſal, an imperfect and erroneous copy was printed, which obliged him, but not till after the death of Mirandola, to publiſh it correctly; and he takes care to allege, in excuſe for himſelf, that he has apprized the reader of his plan by the title of the poem, and warned him in all places where Plato's opinions depart from thoſe of Chriſt, that the doctrines of a gentile and a heathen are not entitled to the leaſt weight compared with the reaſonings of the Chriſtian theologiſts, "and particularly the irrefragable arguments of the angelic doctor St Thomas of Aquino."

The firſt fruit of Mirandola's devotion to ſacred literature was the Heptaplus, or Comment upon the Six Days of the firſt Chapter of Geneſis, which was written in 1491. Two years afterwards he publiſhed a treatiſe in ten chapters, *de Ente et Uno*; the object of which was to reconcile the doctrines of Plato and Ariſtotle, and to demonſtrate that the diſputes of their reſpective followers originated in a miſconception of the opinions of theſe philoſophers relative to the *Ens* and *Unum*, at that time a ſubject of mighty ſtrife among the learned. This treatiſe was held in high eſteem by both ſides. It was the laſt work of conſequence that the author lived to complete; but he had laid the plan of a vaſt and comprehenſive work, which his early death prevented the execution of. This was no leſs than to confound the ſeven enemies of the Chriſtian church, by examining and refuting all their errors. In the proſecution of this deſign, he had compoſed and perfected before his death twelve books againſt aſtrology, the moſt popular and the moſt pernicious ſuperſtition which then infeſted the world. Paulus Jovius, biſhop of Nocera, has left a teſtimony to the merits of this work, which is above all other encomiums:—"In this excellent though unfiniſhed work, Mirandola attacked the aſtrologers with ſuch erudition and keenneſs, and ſo ably expoſed the abſurdity and vanity of the whole art of divination, that he ſeems to have deterred the profeſſors of the occult ſciences from writing *."

* *Paul. Jov. Elog. Doct. Vir.* p. 92.

This great deſign, as well as many others which Mirandola had formed, particularly that of a more complete eſſay towards reconciling the opinions of Plato and Ariſtotle, was fruſtrated by his death. From the time that he left Rome, which was ſoon after the publication of the Apologia, Mirandola generally reſided either at Ferrara or at Florence. The friendſhip of the prince of Ferrara and its vicinity to his paternal ſeat attracted him to the former place; but Florence was the moſt agreeable to him, on account of the ſociety of literary men which it afforded, and particularly of *Politian* and *Lorenzo de Medici*, with whom he entertained a cloſe friendſhip. Beſides theſe two illuſtrious men, his ſociety was cultivated by other eminent ſcholars, among whom was the learned and unfortunate Hieronymus Savanarola, and Hermolaus Barbarus: Petrus Crinitus, the pupil of Politian †, mentions him as excelling all his companions in the erudition and eloquence of his converſation. The ſame author has left us an account of Pica's laborious ſtudies; for when Politian had expreſſed in his preſence high admiration of his great genius and learning, Mirandola with ſingular modeſty anſwered, that he deſerved no praiſe but for his aſſiduous application—"Gratulandum potius, intelligite, aſſiduis vigiliis atque lucubrationibus, quam noſtro ingenio plaudendum ‡."

† *P. Crinitus de honeſta Diſcip.* lib iii. c. 2. lib. v. c. 1. & lib. ii. c. 2.

‡ *Ib.* lib. iii. c. 2.

His library likewiſe is celebrated by the ſame writer, and is ſaid by Franciſco de Mirandola to have coſt 7000 pieces of gold. His accompliſhments were not confined to ſubjects of abſtruſe literature; in his youth he was much attached to muſic, in which he acquired ſuch ſkill, that ſome of his melodies were publicly received, and held in great eſteem. It might alſo be concluded, from an anecdote related by Petrus Crinitus, that he was not unacquainted with phyſic; for according to that author, when Hermolaus Barbarus was ſeized at Rome with a dangerous fever, Mirandola ſent him from Florence a medicine prepared by himſelf. No man ever teſtified a more ſincere devotion for learning and philoſophy, to the contempt of all other qualifications, than the Prince of Mirandola. He poſſeſſed a very large eſtate, which he beſtowed almoſt entirely upon works of charity, except what was ſpent in collecting books, and entertaining and providing for literary men. At length, however, about three years before his death, he made over to his nephew Franciſco his principality and poſſeſſions in Mirandola, and obtained a confirmation of the grant from Maximilian, the Roman emperor, to whom that principality was ſubject. He reſerved to himſelf only enough to purchaſe a ſmall eſtate near Ferrara, where he ſpent the remainder of his life, except when he reſided at Florence, in elegant and learned retirement. His mother, under whoſe care he received his education, had deſtined him for the church; and he was often urged by his friends to embrace the ſacred profeſſion, with the certainty of the higheſt honours and emoluments: but nothing could induce him to quit the life that he had choſen. He died of a fever at Florence, in the year 1494, in the 31ſt year of his age, on the ſame day that Charles IX. of France entered that city on his famous expedition into Italy. That monarch, hearing of Mirandola's illneſs, as he approached the city, ſent two of his own phyſicians to his aſſiſtance; but in ſpite of their aid, the violence of his diſorder put an end to his exiſtence in 13 days.

With reſpect to the works of this author, ſomething has already been ſaid, and little more remains to be obſerved. The *Concluſiones* afford a very complete ſpecimen of the learning of the age, and of what were deemed the moſt valuable purpoſes to which learning could be applied. However uſeleſs and unprofitable theſe purpoſes may appear to us, it will not be denied by any one, who has the curioſity to look through the *Concluſiones*, that the maſs of learning, which muſt have been poſſeſſed by the propoſer of them, is prodigious; when it is recollected that, at the time he propoſed them, he was no more than 23 years of age. For there is not the leaſt reaſon to ſuppoſe, that a perſon whoſe works prove him to have been a man of profound learning, and who, in an age and nation diſtinguiſhed by ſome of the brighteſt ſcholars that ever appeared, was ranked by their own judgement amongſt the firſt, ſhould have challenged the diſcuſſion of any of the propoſed ſubjects, without being well provided with the knowledge neceſſary for ſuch a debate. The manner in which the queſtions were propounded leave little room to doubt that the author was deeply verſed in the reſpective ſubjects of them; and the Apology for the accuſed propoſitions, particularly thoſe *de Salute Origenis* and *de Magia atque Cabala*, diſcover familiarity with the writings of the Fathers, as well as with the Greek and Hebrew claſſics, and a facility of language and argument that could not be acquired at that age without extraordinary powers of mind. It would be worth while to tranſcribe the whole of this curious piece for the amuſement of ſuch of our readers as may not have acceſs to the original, but our limits do not admit of it.

It is curious to obſerve how greatly the ſudden growth of learning outſtripped that of ſound ſcience. No age, perhaps, was ever ſo remarkable for the learning which it produced as the period from the middle of the 15th century to the beginning of the 16th; yet, except the ineſtimable obligations we owe to the learned men of that time for their editions of the claſſics, later ages have been little benefited by their works, which are either loſt or neglected, and even the ſciences they treated of exploded and ridiculed. School-divinity and metaphyſics, though the moſt attended to, were not the only ſtudies in which the vaſt erudition of that age was waſted. The myſterious doctrines of the Cabala formed a favourite ſtudy of ſome of the moſt learned ſcholars. The propoſition which laid Pica open to the indignation of the church, was that in which he aſſerted the orthodoxy of Origen; for Origen, notwithſtanding his meritorious labours in the cauſe of Chriſtianity, his daring zeal and ſelf-martyrdom, and notwithſtanding the defence of Euſebius, was conſigned by the ſentence of the church to inevitable damnation, on account of his errors in the myſteries of the faith. To queſtion his perdition, therefore, was to deny that the church was the interpreter of the divine intentions. The defence of this part of the *Concluſiones* is written with a boldneſs that could hardly be expected from an Italian of the 15th century. But the hardieſt of theſe propoſitions was that in which it is aſſerted, that faith is not in a man's own power. In defending this and the other propoſitions, which were taxed with hereſy, Pica probably relied leſs on the ſpirit and ability of his juſtification, than on his own high rank and ſtation, together with the countenance and protection of his powerful friends, particularly the Medici, whoſe liberality of ſentiment in regard to religious points was ſo notorious, that even Leo X. has been directly charged, not only with hereſy, but infidelity *.

* *Milner's Hiſt. of the Church*, vol. iv.

By the Cabala, a term at this time generally miſapprehended, was underſtood ſometimes a ſpecies of divine magic operating by the agency of good ſpirits, as magic commonly ſo called was ſuppoſed to do by that of evil beings; but the true definition of it, as received by the beſt of its profeſſors, is given by Reuchlinus (A), in his treatiſe addreſſed to Lorenzo de Medici, *Divinæ Revelationis ad ſalutiferam Dei et formarum ſeparatarum contemplationem traditæ ſymbolica receptio*,—a ſymbolical reception of the Moſaic hiſtory (for that is meant by *divina revelatio*) which produced a pure and perfect acquaintance with the nature of the divinity and of ſpirits; and according to the opinions of ſome, which ſeem to be revived by the modern Swedenborgians, this knowledge, when ſublimed to the higheſt perfection it was capable of, and accompanied with perfect piety, was believed to

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(A) This treatiſe, which contains the whole learning upon a ſubject once held in the higheſt veneration by men of learning, is very curious, and is to be found in the folio edition of Mirandola's works, printed at Baſil, an. 1557.

to raiſe the mind to an abſolute familiarity with good angels, by whoſe aſſiſtance the poſſeſſors of the cabalic ſecrets were enabled to do miraculous things. This art was derived from the rabbinical doctors, who were at firſt called Thalmudiſts; and, about the middle of the 15th century, according to Pica de Mirandola †, its profeſſors were denominated Cabalici, Cabalæi, or Cabaliſtæ, according to their different degrees of perfection: they afterwards, however, departed from their maſters the Thalmudiſts; the latter, according to Reuchlinus, being chiefly intent upon the law and the explanation of it, while the former, paying leſs regard to what concerned human affairs, aimed chiefly at elevation of mind and thought. The ideas and doctrines of the Cabaliſts ſeem to have been well known to Milton, and perhaps ſuggeſted ſome paſſages in Paradiſe Loſt. In Reuchlinus's Expoſition of their myſteries there is a curious paſſage deſcribing the ſpeech of the Deity to the heavenly ſpirits after the fall of Adam, with the future proſpect of redemption by the incarnation of the Meſſiah, whom the Cabaliſts recogniſed in the character of a celeſtial Adam (B); and, among the books relating to theſe doctrines, which are ſaid to be loſt, mention is made of *Liber Bellorum Domini*. The myſteries of the Pythagorean philoſophy, which, according to Philolaus apud Reuchlinum, ſprung from the ſame ſource, were alſo ſtudied and taught with great fervency during this period. Mirandola and Paulus Riccius were the firſt who explained the Cabaliſtic myſteries in Latin, and the former, in his Apology, has employed much labour and learning in defending them, as well as the ſcience of natural magic, from the vulgar idea that necromancy was at the bottom of them. His writings, however, upon that ſubject were few, and we do not know whether they ſtill exiſt; but it may be collected from the following propoſition in his *Concluſiones*, and ſome others of a ſimilar nature, that he, like all the ſcholars of his time, had beſtowed much attention upon this uſeleſs learning: "Qui ſcierit quid ſit denarius in Arithmetica formali, et cognoverit natura primi numeri ſphærici, ſciet ſecretum quinquaginta portarum intelligentiæ et magni jobelæi, et milleſimæ generationis, et regnum omnium ſeculorum." Thoſe who are well acquainted with the tenets of the modern millenarians will be able to tell whether there be any connection between them and the alluſions in the concluding part of this propoſition.

Magic alſo entered deeply into the learning of this era. This compriſes two diſtinct ſciences, that of natural magic, and that of dæmonology: the firſt was concerned only in the properties of numbers and figures, and ſome of the more hidden properties of nature. This knowledge enabled its poſſeſſors to produce many effects from natural cauſes, which, when ſcience was leſs diffuſed than at preſent, appeared to be the effect of ſomething ſuperior to the common limits of human power. Albertus, commonly called Magnus, the friend and tutor of Roger Bacon, was the moſt celebrated of thoſe who excelled in this ſort of knowledge. This ſcience has been productive of many admirable diſcoveries in mathematics and chemiſtry. Magic, in its common ſignification, or necromancy, was alſo eagerly ſtudied at this time, as appears from Cornelius Agrippa's ſtrange work upon that ſubject; and we may judge of the eſtimation in which it was held, by the confeſſion that writer makes in his book *De vanitate omnium Scientiarum*, that while he profeſſed that ſcience, he derived more credit and profit from it, than from any other uſe he ever could make of his learning. The firſt maſter in this way was ſaid to be * Solomon, whoſe magic ring and glaſs are ſtill famous in eaſtern dæmonology.

But the moſt dangerous, the moſt popular, and the moſt pernicious deluſion which the darkneſs of the preceding ages had entailed upon mankind, was aſtrology, which will perhaps never be utterly exterminated from the minds of the vulgar, but which then poſſeſſed all ranks. When theſe conſiderations are taken into the account, it muſt be looked upon as no deſpicable application of learning and talents, to have expoſed the fallacy and abſurdity of this deluſion; and when we recollect the great learning and credit of ſome of its upholders, among whom our countryman Roger Bacon was the moſt eſteemed; the almoſt univerſal belief entertained of it, and the few lights which mankind then poſſeſſed, as to the real and conſtant laws obeyed by the celeſtial bodies; it cannot be denied that the twelve books written by Mirandola againſt aſtrology, the effect of which, in opening men's eyes upon that ſubject is teſtified by a reſpectable cotemporary author, were the work of a very ſuperior and enlightened mind. When we congratulate ourſelves upon our freedom from theſe ſuperſtitions, we ought not to forget, that we owe ſomething to thoſe who gave the firſt blow to them. Proud of the lights of the age we live in, when aſtrology and ſuch like cheats are no longer in vogue, we are too apt to overlook the merit of thoſe exertions which firſt expoſed and refuted them; and to perſuade ourſelves, that in theſe days of genius and philoſophy, ſuch exertions would have been unneceſſary; not recollecting that if we enjoy many ſuperiorities of this kind, we are leſs indebted for them to our own genius than to the labours of thoſe who firſt paved the way for the detection of ſuperſtitious errors; our merit is, that we do not ſhut our eyes to the light of ſcience; but while we enjoy its blaze, we ought to be grateful to thoſe who ſtruck the firſt ſparks.

John Pica of Mirandola has been repreſented by writers, whoſe ideas are taken from the encomiums of his cotemporaries, as a mighty prodigy of learning and genius. The diſtaſte which the preſent times entertain towards thoſe ſubjects upon which he wrote, renders it very difficult, upon a review of his works, to think thoſe encomiums juſtified. But making allowance for this change of opinion, and weighing the impartial teſtimony of his equals, and the early age at which he obtained their admiration, it may be fairly concluded, he was in reality, a man of very extraordinary powers. Theſe memoirs are principally collected from his letters, and the account given of him by his nephew Franciſco, himſelf

† *Reuchlinus de Arte Cabaliſt.*

* *P. Crinitus de honeſta Diſcip.* l.b. ix. c. 5.

(B) Conjicimus ſane, alterum eſſe Adam cæleſtem angelis in cœlo demonſtratum, unum ex Deo, quem verbo fecerat, et alterum eſſe Adam terrenum, repulſum à Deo, quem ex luto manibus ſuis finxerat. *Reuchlinus*, p. 750.

ſelf an eminent ſcholar. Such a biographer might naturally be ſuſpected of partiality; but the evidence of other writers fully confirms his account. Paulus Jovius, in his *Elogia Doctorum Virorum*, gives the following character of him *. "John Pica of Mirandola, has been juſtly ſtyled the phœnix; for in him, the immortal gods, beſides the ſplendour of his family, aſſembled all the rareſt gifts of body and mind."

Petrus Riccius, commonly called Petrus Crinitus, who was the pupil of Politian and the companion of Mirandola, laments the death of him and Politian, which happened in the ſame year, as a public misfortune, more ſeverely felt at that particular time, when learning, obſtructed by the incurſion of the French into Italy, wanted the ſupport and aſſiſtance of ſuch men ‡. To theſe may be added the teſtimony of Hieronymus Savanarola, who, though afterwards put to death by Pope Alexander for a heretic, was a man of great conſideration on account of his learning and talents. In a diſpute which took place between him and Mirandola, concerning the philoſophy of the ancients; the former, yielding to the ſuperiority of his opponent, roſe up and embracing him ſaid, "Unus tu es, Pice, ætate noſtra qui omnium veterum philoſophiam ac religionis Chriſtianæ præcepta et leges percalleas ‖." The following epitaph, written by Hercules Strozza, is preſerved by Paulus Jovius:

Joannes jacet hic Mirandola; cætera norunt
Et Tagus et Ganges, forſan et Antipodes.

Dr Johnſon, in his Eſſay on Epitaphs, has taken notice of this pompous diſtich, as a warning to epitaph writers. "Thus, ſays he, have their expectations been diſappointed, who honoured Picus of Mirandola with this pompous epitaph. His name, then celebrated in the remoteſt corners of the earth, is now almoſt forgotten; and his works, then ſtudied, admired, and appaluded, are now mouldering in obſcurity." *Monthly Mag.*

PICARD, a native of the Netherlands, who founded a ſect the profeſſors of which were called *Picards*. See PICARDS.

PICARD, *John*, an able mathematician, and one of the moſt learned aſtronomers of the 17th century, was born at Fleche, and became prieſt and prior of Rillie in Anjou. Going to Paris, he was in 1666 received into the Academy of Sciences in quality of aſtronomer. In 1671, he was ſent, by order of the king, to the caſtle of Uraniburg, built by Tycho Brahe in Denmark, to make aſtronomical obſervations there; and from thence he brought the original manuſcripts wrote by Tycho Brahe, which are the more valuable as they differ in many places from the printed copies, and contain a book more than has yet appeared. He made important diſcoveries in aſtronomy; and was the firſt who travelled through ſeveral parts of France, to meaſure a degree of the meridian. His works are, 1. A treatiſe on levelling. 2. Fragments of dioptrics. 3. *Experimenta circa aquas effluentes.* 4. *De menſuris.* 5. *De menſura liquidorum & aridorum.* 6. A voyage to Uraniburg, or aſtronomical obſervations made in Denmark. 7. Aſtronomical obſervations made in ſeveral parts of France, &c. Theſe, and ſome other of his works, which are much eſteemed, are in the ſixth and ſeventh volumes of the Memoirs of the Academy of Sciences.

PICARDS, a religious ſect which aroſe in Bohemia in the 15th century.

Picard, the author of this ſect, from whom it derived its name, drew after him, as has been generally ſaid, a number of men and women, pretending he would reſtore them to the primitive ſtate of innocence wherein man was created; and accordingly he aſſumed the title of the *New Adam*. With this pretence he taught his followers to give themſelves up to all impurity; ſaying, that therein conſiſted the liberty of the ſons of God; and that all thoſe not of their ſect were in bondage. He firſt publiſhed his notions in Germany and the Low Countries, and perſuaded many people to go naked, and gave them the name of *Adamites*. After this he ſeized on an iſland in the river Lanſnecz, four leagues from Thabor, the head quarters of Ziſca, where he fixed himſelf and his followers. His women were common, but none were allowed to enjoy them without his permiſſion: ſo that when any man deſired a particular woman, he carried her to Picard, who gave him leave in theſe words, *Go, increaſe, multiply, and fill the earth.*

At length, however, Ziſca, general of the Huſſites, (famous for his victories over the emperor Sigiſmund), hurt at their abominations, marched againſt them, made himſelf maſter of their iſland, and put them all to death except two; whom he ſpared, that he might learn their doctrine.

Such is the account which various writers, relying on the authorities of Æneas Sylvius and Varillas, have given of the Picards, who appear to have been a party of the Vaudois, that fled from perſecution in their own country, and ſought refuge in Bohemia. It is indeed doubtful whether a ſect of this denomination, chargeable with ſuch wild principles and ſuch licentious conduct, ever exiſted: and it is certainly aſtoniſhing that Mr Bayle, in his art. *Picards*, ſhould adopt the reproachful repreſentations of the writers juſt mentioned: for it appears probable at leaſt that the whole is a calumny invented and propagated in order to diſgrace the Picards, merely becauſe they deſerted the communion and proteſted againſt the errors of the church of Rome. Laſitius informs us, that Picard, together with 40 other perſons, beſides women and children, ſettled in Bohemia in the year 1418. Balbinus the Jeſuit, in his *Epitome Rerum Bohemicarum*, lib. ii. gives a ſimilar account, and charges on the Picards none of the extravagancies or crimes aſcribed to them by Sylvius. Schlecta, ſecretary of Ladiſlaus, king of Bohemia, in his letters to Eraſmus in which he gives a particular account of the Picards, ſays that they conſidered the pope, cardinals, and biſhops of Rome, as the true Antichriſts, and the adorers of the conſecrated elements in the euchariſt as downright idolaters; that they denied the corporal preſence of Chriſt in this ordinance; that they condemned the worſhip of ſaints, prayers for the dead, auricular confeſſion, the penance impoſed by prieſts, the feaſts and vigils obſerved in the Romiſh church; and that they confined themſelves to the obſervance of the ſabbath, and of the two great feaſts of Chriſtmas and Pentecoſt. From this account it would appear that they were no other than the Vaudois; and M. de Beauſobre has ſhown that they were both of the ſame ſect, though under different denominations. Beſides, it is certain that the Vaudois

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* P. 92.

‡ Pet. Crin. de honeſta Diſc.

‖ Ibid.

Piccolomini.

were ſettled in Bohemia in the year 1178, where ſome of them adopted the rites of the Greek, and others thoſe of the Latin church. The former were pretty generally adhered to till the middle of the 14th century, when the eſtabliſhment of the Latin rites cauſed great diſturbance. On the commencement of the national troubles in Bohemia, on account of the oppoſition to the papal power (ſee Moravians), the Picards more publicly avowed and defended their religious opinions; and they formed a conſiderable body in an iſland by the river Launitz or Lauſnecz, in the diſtrict of Bechin, and recurring to arms, were defeated by Ziſca. *Encyclop.* art. Picards.

PICARDY, a province in France, is bounded on the north by Hainault, Artois, and the ſtraits of Calais; on the eaſt by Champagne; on the ſouth by the Iſle of France; and on the weſt by Normandy and the Engliſh channel (A). This province is long and narrow, being uſually compared to a bent arm; and in this figure is nearly 150 miles in length, but not above 40 in breadth, and in many places not above 20. It is generally a level country; and produces wine, fruit of all kinds, plenty of corn, and great quantities of hay: but wood being ſcarce, moſt of the inhabitants burn turf. They have, however, ſome pit-coal, but it is not ſo good as that of England. It was united to the crown of France in the year 1643; and is ſuppoſed to contain 533,000 inhabitants.

Its principal rivers are the Somme, the Oiſe, the Canche, the Lanthie, the Lys, the Aa, the Scarpe, and the Deule.

The ſituation of this province on the ſea, its many navigable rivers and canals, with the induſtry of the inhabitants, render it the ſeat of a flouriſhing trade. In it are made beautiful ſilk ſtuffs, woollen ſtuffs, coarſe linen, lawn, and ſoap; it alſo carries on a large trade in corn and pit-coal. In the diſtricts of Calais and Boulogne are annually bred 5000 or 6000 colts, which being afterwards turned looſe in the paſtures of Normandy, are ſold for Norman horſes. The fiſheries on this coaſt are alſo very advantageous. This province was formerly divided into Upper, Middle, and Lower Picardy; and again ſubdivided into four deputy-governments. The principal town is Amiens.

PICCOLOMINI, Alexander, archbiſhop of Patras, and a native of Sienna, where he was born about the year 1508, was of an illuſtrious and ancient family, which came originally from Rome, but afterwards ſettled at Sienna. He compoſed with ſucceſs for the theatre; but he was not more diſtinguiſhed by his genius, than by the purity of his manners, and his regard to virtue. His charity was very great; and was chiefly exerted in relieving the neceſſities of men of letters. He has left behind him a number of works in Italian. The moſt remarkable of which are, 1. Various Dramatic Pieces, which laid the firſt foundation of his character as a writer. 2. A Treatiſe on the Sphere. 3. A Theory of the Planets. 4. A Tranſlation of Ariſtotle's Art of Rhetoric and Poetry, in 4to. 5. A Syſtem of Morality, publiſhed at Venice, 1575, in 4to; tranſlated into French by Peter de Larivey in 4to; and printed at Paris, 1581. Theſe, with a variety of other works, prove his extenſive knowledge in natural philoſophy, mathematics, and theology. He was the firſt who made uſe of the Italian language in writing upon philoſophical ſubjects. He died at Sienna the 12th of March 1578, aged 70. A particular catalogue of his works may be ſeen in the Typographical Dictionary. There is one performance aſcribed to this author, entitled *Dialogo della bella Creanta delle Donne*, (printed at Milan, 1558, and at Venice, 1574, in 8vo.); which but ill ſuits the dignity of a prelate. It is filled with maxims which have an evident tendency to hurt the morals of young women. Piccolomini's name, indeed, is not in the title page; and it has all the appearance of being a juvenile production. It is very ſcarce; and the public would ſuſtain no loſs by its being entirely out of print. It was tranſlated into French by F. d'Amboiſe, and publiſhed at Lyons, in 16mo, under the title of *Inſtruction des jeunes dames*. It was afterwards reprinted in 1583, under that of *Dialogue & Devis des Demoiſelles*.

Piccolomini.

Piccolomini, *Francis*, of the ſame family with the foregoing, was born in 1520, and taught philoſophy with ſucceſs, for the ſpace of 22 years, in the moſt celebrated univerſities of Italy, and afterwards retired to Sienna, where he died, in 1604, at the age of 84. This city went into mourning on his death. His works are, 1. Some Commentaries upon Ariſtotle, printed at Mayence, 1608, in 4to. 2. *Univerſa Philoſophia de Moribus*, printed at Venice, 1583, in folio. He laboured to revive the doctrine of Plato, and endeavoured alſo to imitate the manners of that philoſopher. He had for his rival the famous James Zabarella, whom he excelled in facility of expreſſion and neatneſs of diſcourſe; but to whom he was much inferior in point of argument, becauſe he did not examine matters to the bottom as the other did, but preſſed too rapidly from one propoſition to another.

Piccolomini of *Arragon*, *Octavius*, duke of Amalfi, prince of the Empire, a general of the emperor's army, and knight of the order of the Golden Fleece, was born in 1599. He firſt bore arms among the Spaniſh troops in Italy. He afterwards ſerved in the army of Ferdinand II. who ſent him to the relief of Bohemia, and entruſted him with the command of the imperial troops in 1634. After having ſignalized himſelf at the battle of Nortlingue, he made Marſhal de Chatillon raiſe the ſiege of St Omer. He had the good fortune to gain a victory over Marquis de Feuquieres in 1639: nor did the loſs of the battle of Wolfenbuttel, in 1651, impair his glory. He died on the 10th of Auguſt 1656, being five years after, aged 57, without iſſue; and with the character of an able negotiator and an active general. The celebrated Caprara was his nephew.

Piccolomini,

(A) The origin of the name of this province does not date earlier than A. D. 1200. It was an academical joke; an epithet firſt applied to the quarrelſome humour of thoſe ſtudents in the univerſity of Paris who came from the frontier of France and Flanders, and hence to their country *Valeſii Notitia Galliarum*, p. 447. *Longuerue, Deſcription de la France*, p. 52.

Piccolomini, *James*, whoſe proper name was *Ammanati*, took that of *Piccolomini* in honour of his patron Pius II. He was born in a village near Lucca in 1422. He became biſhop of Maſſa, afterwards of Freſcati; a cardinal in 1461, under the name of *Cardinal de Pavie*; and died in 1479, at the age of 57, of an indigeſtion of figs. He left 8000 piſtoles in the bankers hands, which Pope Sixtus IV. claimed; and of which he gave a part to the Hoſpital of the Holy Ghoſt. His works, which conſiſt of ſome Letters, and a hiſtory of his own time, were printed at Milan, in 1521, in folio. His hiſtory, entitled *Commentaries*, commences the 18th of June 1464, and ends the 6th of December 1469. They may very properly be conſidered as a ſequel of Pope Pius II.'s Commentaries, which end with the year 1463.

Piccolomini, Æneas Sylvius. See Pius II.

PICENTIA, (Strabo, Pliny), the capital of the Picentini, whoſe territory, called *Ager Picentinus*, a ſmall diſtrict, lay on the Tuſcan ſea, from the *Promontorium Minervæ*, the ſouth boundary of Campania on the coaſt, to the river Silarus, the north boundary of Lucania, extending within-land as far as the Samnites and Hirpini, though the exact termination cannot be aſſigned. The Greeks commonly confound the *Picentini* and *Picentes*, but the Romans carefully diſtinguiſh them. The former, with no more than two towns that can be named, *Salernum* and *Picentia*; the ſituation of both doubtful: only Pliny ſays the latter ſtood within-land, at ſome diſtance from the ſea. Now thought to be *Bicenza*, (Holſtenius), in the Principato Citra of Naples.

Picenum, (Cæſar, Pliny, Florus): Picenus Ager, (Cicero, Salluſt, Livy, Tacitus); *Ager Picentium*, (Varro): a territory of Italy, lying to the eaſt of Umbria, from the Apennine to the Adriatic; on the coaſt extending from the river Aeſis on the north, as far as the *Prætutiani* to the ſouth. In the upper or northern part of their territory the Umbri excluded them from the Apennine, as far as Camerinum, (Strabo); but in the lower or ſouthern part they extended from the Adriatic to the Apennine. A very fruitful territory, and very populous. *Picentes*, the people, (Cicero); from the ſingular *Picens*, (Livy): different from the *Picentini* on the Tuſcan ſea, though called ſo by the Greeks; but Ptolemy calls them *Picentes*, as does alſo Pliny. Their territory at this day is ſuppoſed to form the greateſt part of the March of Ancona, (Cluverius).

PICHFORD, in the county of Salop in England; on the ſouth-eaſt ſide of Shrewſbury, near Condover. It is noted for a ſpring of pitchy water (from whence ſome derive its name), on the top of which there always flows a ſort of liquid bitumen. Over moſt of the coal pits in this neighbourhood there lies a ſtratum of blackiſh rock: of which, by boiling and grinding, they make pitch and tar, and alſo diſtil an oil from it.

PICHINCHA, or Pinchinca, a mountain in Peru. See Peru, Nº 56.

PICKERING, in the north riding of Yorkſhire in England, 13 miles from Scarborough, and 125 from London, is a pretty large town belonging to the duchy of Lancaſter, on a hill among the wild mountains of Blakemore; having the foreſt of Pickering on the north, and Pickering common on the ſouth. It is ſaid to have been built 270 years before Chriſt by Peridurus, a king of the Britons, who was buried here. It had once a caſtle, the ruins of which are ſtill to be ſeen; to whoſe juriſdiction many of the neighbouring villages were ſubject: and the adjacent territory, commonly called Pickering-Lath, or the liberty or foreſt of Pickering, was given by Henry III. to his ſon Edmund earl of Lancaſter. A court is kept here for all actions under 40s. ariſing within the honour of Pickering.

PICKERY, in *Scots Law*, petty theft, or ſtealing things of ſmall value.

PICKETS, in fortification, ſtakes ſharp at one end, and ſometimes ſhod with iron, uſed in laying out the ground, of about three feet long; but, when uſed for pinning the faſcines of a battery, they are from three to five feet long.

Pickets, in artillery, are about five or ſix feet long, ſhod with iron, to pin the park lines, in laying out the boundaries of the park.

Pickets, in the camp, are alſo ſtakes of about ſix or eight inches long, to faſten the tent cords, in pitching the tents; alſo, of about four or five feet long, driven into the ground near the tents of the horſemen, to tie their horſes to.

Picket, an out-guard poſted before an army, to give notice of an enemy approaching.

Picket, a kind of puniſhment ſo called, where a ſoldier ſtands with one foot upon a ſharp pointed ſtake; the time of his ſtanding is limited according to the offence.

PICKLE, a brine or liquor, commonly compoſed of ſalt, vinegar, &c. ſometimes with the addition of ſpices, wherein meat, fruit, and other things, are preſerved and ſeaſoned.

PICO, one of the Azores iſlands, is ſo called from ſome lofty mountains on it; or rather from one very high mountain, terminating like Teneriffe in a peak, and reputed by ſome writers equal to it in height. This iſland lies about four leagues ſouth-weſt from St George, twelve from Tercera, and about three leagues ſouth-eaſt of Fayal; in W. Long. 28. 21. and N. Lat. 38. 29. The mountain Pico, which gives name to the iſland, is filled with diſmal dark caverns or volcanoes, which frequently vomit out flames, ſmoke, and aſhes, to a great diſtance. At the foot of this mountain towards the eaſt is a ſpring of freſh water, generally cold, but ſometimes ſo heated with the ſubterraneous fire, as to ruſh forth in torrents with a kind of ebullition like boiling water; equalling that in heat, and ſending forth a ſteam of ſulphureous fetid vapours, liquefied ſtones, minerals, and flakes of earth all on fire, in ſuch quantities, and with ſuch a violence, as to have formed a kind of promontory vulgarly called *Mysterio*, on the declivity of the coaſt, and at the diſtance of 1200 paces from the fountain. Such at leaſt is the account of Ortelius; though we do not find this laſt circumſtance of the promontory confirmed by later obſervations. The circumference of Pico is computed at about 15 leagues: and its moſt remarkable places are Pico, Lagoas, Santa Cruce or Cruz, San Sebaſtian, Peipain, San Rocko, Pieda, and Magdalena; the inhabitants of which live wholly on the produce of the iſland, in great plenty and felicity. The cattle are various, numerous, and excellent in their ſeveral kinds: it is the ſame with the vine; and its juice, prepared into different wines, the beſt in the Azores.

Beſides cedar and other timber, they have a kind of wood which they call *teixo*, ſolid and hard as iron; and veined, when finely poliſhed, like a rich ſcarlet tabby; which colour it has in great perfection. The longer it is kept, the more beautiful it grows: hence it is, that the teixo tree is felled only for the king's uſe or by his order; and is prohibited from being exported as a common article of trade.

Pico *Marino*, a ſea fiſh common at Kongo in Africa, derives its name from the reſemblance of its mouth to the beak of a woodpecker. It is of a large ſize, and prodigious ſtrength, has four fins on its back, three under its belly, and one on each ſide of its head; its tail is large and forked, by which it cuts the waves with ſurpriſing force and velocity. It is at war with every fiſh that ſwims, and with every thing it meets in its way, without being intimidated by the largeſt veſſels; a ſurpriſing inſtance of which intrepidity, we are told by ſome miſſionaries, whoſe ſhip was attacked by one of them, near theſe coaſts, in the dead of night. The violence of the ſhock which it gave to the veſſel quickly awakened the captain and the reſt of the people; who immediately ran to the ſhip's ſide, where they perceived, by moon light, this huge monſter faſtened by its forehead to the veſſel, and making the ſtrongeſt efforts to diſengage itſelf; upon which ſome of them tried to pierce him with their pikes, but he got off before they could accompliſh their aim. On the next morning, upon viſiting that ſide of the veſſel, they found a piece of the bony ſnout ſtuck faſt into the wood, and two or three inches of it projecting outwards. In the inſide of the ſhip, there was diſcovered about five or ſix inches more of the point of the horn, which had penetrated through the plank. But we muſt obſerve, that the credulity of the times probably rendered this animal thus formidable.

Mod. Univ. Hiſtory, vol. xiii. p. 46. &c.

PICQUERING, a flying war, or ſkirmiſh, made by ſoldiers detached from two armies for pillage, or before a main battle begins.

PICQUET, or Picket. See Piquet.

PICRAMNIA, a genus of plants belonging to the diœcia claſs; and in the natural method ranking with thoſe that are doubtful. See Botany *Index*.

PICRANIA amara, or *Bitter Wood*, is a tall and beautiful timber tree, common in the woods of Jamaica, belonging to the pentandria claſs of plants. The name is expreſſive of its ſenſible qualities.

Every part of this tree is intenſely bitter; and even after the tree has been laid for floors many years, whoever rubs or ſcrapes the wood, feels a great degree of bitterneſs in their mouth or throat. Cabinet-work made of this wood is very uſeful, as no inſect will live near it.

This tree has a great affinity to the *Quaſſia Amara* of Linnæus; in lieu of which it is uſed as an antiſeptic in putrid fevers. When uſed, leſs of it will do than of the *Quaſſia Amara* of Surinam. See Quassia, Botany and Materia Medica *Index*.

PICRIS, Ox-tongue; a genus of plants, belonging to the ſyngeneſia claſs. See Botany *Index*.

PICRIUM, a genus of plants, belonging to the tetrandria claſs; and in the natural method ranking with thoſe that are doubtful. See Botany *Index*.

PICTET, Benedict, a celebrated divine, was born at Geneva, in 1655, of a diſtinguiſhed family, and proſecuted his ſtudies with great ſucceſs. After having travelled into Holland and England, he taught theology in his own country with an extraordinary reputation. The univerſity of Leyden, after the death of Spantreina, ſolicited him to come and fill his place; but he thought that his own country had the beſt right to his ſervices: and for that generoſity he received its thanks by the mouth of the members of council. A languiſhing diſorder, occaſioned by too much fatigue, haſtened his death: which happened on the 9th of June 1724, at the age of 69 years. This miniſter had much ſweetneſs and affability in his manner. The poor found in him a comforter and a father. He publiſhed a great number of works in Latin and French, which are much eſteemed in Proteſtant countries. The principal of theſe are, 1. A Syſtem of Chriſtian Theology in Latin, 3 vols. in 4to; the beſt edition of which is that of 1721. 2. Chriſtian Morality, printed at Geneva, 1710, 8 vols. in 12mo. 3. The Hiſtory of the 11th and 12th centuries; intended as a ſequel to that of Sueur, printed in 1713, 2 vols. in 4to. The Continuator is held in higher eſtimation than the firſt author. 4. Several Controverſial Treatiſes. 5. A great number of tracts on morality and piety; among which we muſt diſtinguiſh "the Art of Living and Dying well;" publiſhed at Geneva, 1705, in 12mo. 6. Some Letters. 7. Some Sermons, from 1697 to 1721; 4 vols. in 8vo. With a vaſt number of other books, the names of which it would be tedious to mention; but which, as Mr Sennebier ſays, "all ſhow evident marks of piety and good ſenſe."

PICTET, *John-Louis*, a counſellor of Geneva, born in 1739, was of the ſame family. He was member of the Council of Two Hundred; Counſellor of State and Syndic; and died in 1781. He applied himſelf to the ſtudy of aſtronomy, and made ſeveral voyages into France and England for his improvement. Few men were ever bleſſed with a clearer or more enlightened underſtanding. He has left in manuſcript the "Journal of a Voyage which he made to Ruſſia and Siberia in 1768 and 1769, in order to obſerve the tranſit of Venus over the ſun's diſk:" A work very intereſting, from the lively deſcriptions which it gives both of men and of nature.

PICTLAND. See Pentland.

1 Name.

PICTS, the name of one of thoſe nations who anciently poſſeſſed the north of Britain. It is generally believed that they were ſo called from their cuſtom of painting their bodies; an opinion which Camden ſupports with great erudition. (See Gough's edition, Vol. I. p. xci. of the preface). It is certainly liable, however, to conſiderable objections; for as this cuſtom prevailed among the other ancient inhabitants of Britain, who uſed the *glaſtum* of Pliny and the *vitrum* of Mela for the like purpoſe, it may be aſked, Why the name of *Picti* was confined by the Romans to only one tribe, when it was equally applicable to many others? Why ſhould they deſign them only by an epithet, without ever annexing their proper name? Or why ſhould they impoſe a new name on this people only, when they give their proper name to every other tribe which they have occaſion to ſpeak of? As theſe queſtions cannot be anſwered in any ſatisfactory manner, it is plain we muſt look for ſome other derivation of the name.

The Highlanders of Scotland, who ſpeak the ancient language of Caledonia, expreſs the name of this once famous

Picts. mous nation by the term *Pictich;* a name familiar to the ears of the moſt illiterate, who could never have derived it from the Roman authors. The word *Pictich* means *pilferers* or *plunderers*. The appellation was probably impoſed upon this people by their neighbours, or aſſumed by themſelves, ſome time after the reign of Caracalla, when the unguarded ſtate of the Roman province, on which this people bordered, gave them frequent opportunities of making incurſions thither, and committing depredations. Accordingly this name ſeems to have been unknown till the end of the 3d century. Eumenius the panegyriſt is the firſt Roman author who mentions this people under their new name of *Pictich*, or, with a Latin termination, *Picti*. When we ſay that this name may have been probably aſſumed for the reaſon juſt now mentioned, we muſt obſerve, that, in thoſe days of violence, the character of a robber was attended with no diſgrace. If he had the addreſs to form his ſchemes well, and to execute them ſucceſsfully, he was rather praiſed than blamed for his conduct; providing he made no encroachments on the property of his own tribe or any of its allies. We mean this as no peculiar ſtigma upon the Picts; for other nations of antiquity, in the like rude ſtate, thought and acted as they did. See *Thucydides*, lib. iii. p. 3. and *Virg. Æn.* vii. 745 et 749.

2 Origin. Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Agathyrſi, Pomponius Lætus from the Germans, Bede from the Scythians, Camden (A) and Father Innes from the ancient Britons, Stillingfleet from a people inhabiting the Cimbrica Cherſoneſus, and Keating and O'Flaherty, on the authority of the Cathel Pſalter, derive them from the Thracians. But the moſt probable opinion is, that they were the deſcendants of the old Caledonians. Several reaſons are urged in ſupport of this opinion by Dr Macpherſon; and the words of Eumenes, "Caledonum, aliorumque Pictorum, ſilvas," &c. plainly imply that the Picts and Caledonians were one and the ſame people.

As there has been much diſpute about the origin of the Picts, ſo there has been likewiſe about their language. There are many reaſons which make it plain that their tongue was the Gaelic or Celtic; and theſe reaſons are a further confirmation of their having been of Caledonian extract. Through the eaſt and north-eaſt coaſts of Scotland (which were poſſeſſed by the Picts) we meet

3 Language. with an innumerable liſt of names of places, rivers, mountains, &c. which are manifeſtly Gaelic. From a very old regiſter of the priory of St Andrew's (Dalrymple's Collections, p. 122.) it appears, that in the days of Hungus, the laſt Pictiſh king of that name, St Andrew's was called *Mukroſs;* and that the town now called *Queensferry* had the name of *Ardchinneachan*. Both theſe words are plain Gaelic. The firſt ſignifies "the heath or promontory of boars;" and the latter, "the height or peninſula of Kenneth." In the liſt of Pictiſh kings publiſhed by Father Innes, moſt of the names are obviouſly Gaelic, and in many inſtances the ſame with the names in the liſt of Scottiſh or Caledonian kings publiſhed by the ſame writer. Had Innes underſtood any thing of this language, he would not have agreed with Camden that the Picts ſpoke the Britiſh tongue. It was unlucky that the two words on which they built their conjecture (*Strath* and *Aber*) are as common in the Gaelic as they could have been in the Britiſh, and at this day make a part of the names of places in countries to which the Pictiſh empire never extended. The names of *Strathfillan* and *Lochaber* may ſerve as inſtances. Picts.

The venerable Bede, as much a ſtranger to the Celtic as either of the antiquaries juſt now mentioned, is equally unhappy in the ſpecimen which he gives of the Pictiſh language in the word *penuahel*, "the head of the wall." Allowing the commutation of the initial *p* into *c*, as in ſome other caſes, this word has ſtill the ſame meaning in Gaelic which Bede gives it in the Pictiſh. It is true, there might have been then, as well as now, a conſiderable difference between various dialects of the Celtic; and thus, perhaps, that pious author was led to diſcover five languages in Britain *agreeably to the five books of Moſes:* A conceit from which the good man derived a great deal of harmleſs ſatisfaction.

The Picts of the earlieſt ages, as appears from the 4 Territory. joint teſtimony of all writers who have examined the ſubject, poſſeſſed only the eaſt and north-eaſt coaſt of Scotland. On one ſide, the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dumbarton to the frith of Tain, which ſeparates the county of Sutherland from a part of Roſs, was the boundary of the Pictiſh dominions. Accordingly we find in the life of Columba, that, in travelling to the palace of Brudius, king of the Picts, he travelled over Drumalbin, the *Dorſum Britanniæ* of Adomnan. On the other ſide, the territory of the Picts was bounded by the Roman province. After Britain was relinquiſhed by the emperor Honorius, they and the Saxons by turns were maſters of thoſe countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede, that the Saxons were maſters of Galloway when he finiſhed his Eccleſiaſtical Hiſtory. The Picts, however, made a conqueſt of that country ſoon after; ſo that, before the extinction of their monarchy, all the territories bounded on the one ſide by the Forth and Clyde, and on the other by the Tweed and Solway, fell into their hands.

The hiſtory of the Picts, as well as of all the other 5 History. ancient inhabitants of Britain, is involved in obſcurity. The Iriſh hiſtorians give us a long liſt of Pictiſh kings, who reigned over Pictavia for the ſpace of 11 or 13 centuries before the Chriſtian era. After them Innes, in his Critical Eſſay, gives us a liſt of above fifty, of whom no leſs than five held the ſceptre, each for a whole century. It is probable that theſe writers had confounded the hiſtory of the Picts with that of their anceſtors the old Caledonians. In any other view, their accounts of them are highly fabulous; and have been long ago confuted by Dr Macpherſon of Slate, an antiquary of much learning and reſearch. The Picts, as has been

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(A) See *Gough's edition of Camden*, Vol. I. Preface, p. xc. and the *Ancient Universal History*, Vol. XVIII. p. 39, &c.

already obſerved, were probably not known by that name before the 2d or 3d century. Adamnan, abbot of Iona, is the firſt author that expreſsly mentions any Pictiſh king; and the oldeſt after him is Bede. We are informed by theſe two writers, that St Columba converted Brudius king of the Picts to the Chriſtian faith. Columba came into Britain in the year of the vulgar era 565. Before that period we have no general record to aſcertain ſo much as the name of any Pictiſh king. The hiſtory of *Druſt* or *Dreſt*, who is ſaid to have reigned over the Picts in the beginning of the fifth century, when St Ninian firſt preached the goſpel to that nation, has all the appearance of fiction (B). His having reigned a hundred years, and his putting an end to a hundred wars, are ſtories which exceed all the bounds of probability.

Brudius, the contemporary of Columba, is the firſt Pictiſh king mentioned by any writer of authority.

What figure his anceſtors made, or who were his ſucceſſors on the throne of Pictavia, cannot be aſcertained. Bede informs us, that, during the reign of one of them, the Picts killed Egfred king of Northumberland in battle, and deſtroyed the greateſt part of his army. The ſame author mentions another of their kings called *Naitan*, for whom he had a particular regard. It was to this *Naitan* that Ceolfrid, abbot of Wiremouth, wrote his famous letter concerning Eaſter and the Tonſure (C); a letter in which Bede himſelf is ſuppoſed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictiſh kings *Onnuſt* and *Kinoth*, the firſt of whom died in 761, and the latter flouriſhed about the 774, and gave an aſylum to Alfred of Northumberland, who was much about that time expelled his kingdom. The accounts given by the Scots hiſtorians of ſeveral other Pictiſh kings cannot be depended on; nor are the ſtories told by the Britiſh hiſtorians, Geoffroy of Monmouth and the author of the *Eulogium Britanniæ*, worthy of much greater credit.

In the ninth century the Pictiſh nation was totally ſubdued by the Scots in the reign of Kenneth Macalpin. Since that time their name has been loſt in that of the conquerors, with whom they were incorporated after this conqueſt; however, they ſeem to have been treated by the Scottiſh kings with great lenity, ſo that for ſome ages after they commanded a great deal of reſpect. The prior of Hogulſtead, an old Engliſh hiſtorian, relates, that they made a conſiderable figure in the army of David the Saint, in his diſputes with Stephen king of England. In a battle fought in the year 1136, by the Engliſh on one ſide, and the Scots and Picts on the other, the latter inſiſted on their hereditary right of leading the van of the Scots army, and were indulged in that requeſt by the king.

The principal ſeat of the Pictiſh kings was at Abernethy. Brudius, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverneſs, which was probably near the extremity of his territory in that quarter; for there is no good reaſon for believing, with Camden, that this king had any property in the Weſtern Iſles, or that he had made a gift of Iona to St Columba when he viſited him in that place.

With reſpect to the manners and cuſtoms of the Picts, there is no reaſon to ſuppoſe they were any other than thoſe of the old Caledonians and Scots, of which many particulars are related in the Greek and Roman writers who have occaſion to ſpeak of thoſe nations. 6 Manners.

Upon the decline of the Roman empire, cohorts of barbarians were raiſed, and Picts were invited into the ſervice, by Honorius, when peace was every where reſtored, and were named *Honoriaci*. Thoſe under Conſtantine opened the paſſes of the Pyrenean mountains, and let the barbarous nations into Spain. From this period we date the civilization of their manners, which happened after they had by themſelves, and then with the Scots, ravaged this Roman province.

PICTS Wall, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incurſions of the Picts and Scots. It was firſt made only of turf ſtrengthened with paliſadoes, till the emperor Severus, coming into Britain in perſon, built it with ſolid ſtone. This wall, part of which ſtill remains, began at the entrance of the Solway frith in Cumberland, and running north-eaſt extended to the German ocean. See ADRIAN and SEVERUS.

PICTURE, a piece of painting, or a ſubject repreſented in colours, on wood, canvas, paper, or the like. See PAINTING.

PICTURESQUE BEAUTY, ſays a late writer on that ſubject, refers to "ſuch beautiful objects as are ſuited to the pencil." This epithet is chiefly applied to the works of nature, though it will often apply to works of art alſo. Thoſe objects are moſt properly denominated pictureſque, which are diſpoſed by the hand of nature with a mixture of *varied rudeneſs*, *ſimplicity*, and *grandeur*. A plain neat garden, with little variation in its plan, and no ſtriking grandeur in its poſition, diſplays too much of art, deſign, and uniformity, to be called pictureſque. "The ideas of *neat* and *ſmooth* (ſays Mr Gilpin), inſtead of being pictureſque, in fact diſqualify the object in which they reſide from any pretenſions to pictureſque beauty. Nay, farther, we do not ſcruple to aſſert, that roughneſs forms the moſt eſſential point of difference between the beautiful and the pictureſque; as it ſeems to be that particular quality which makes

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(B) According to Camden, this converſion happened about the year 630, in the ſouthern Pictiſh provinces; while the northern, which were ſeparated by fruitful mountains, were converted by Columba.

(C) We are told by ſome authors that Columba taught the Picts to celebrate Eaſter always on a Sunday between the 14th and 20th of March, and to obſerve a different method of tonſure from the Romans, leaving an imperfect appearance of a crown. This occaſioned much diſpute till Naitan brought his ſubjects at length to the Roman rule. In that age many of the Picts went on a pilgrimage to Rome, according to the cuſtom of the times; and amongſt the reſt we find two perſons mentioned in the antiquities of St Peter's church. *Aſterius* count of the Picts, and *Syra* with his countrymen, performed their vow.

Picturesque Beauty.

makes objects chiefly pleaſing in painting. I uſe the general term *roughneſs*; but properly ſpeaking roughneſs relates only to the ſurfaces of bodies: when we ſpeak of their delineation, we uſe the word *ruggedneſs*. Both ideas, however, equally enter into the picturesque, and both are obſervable in the ſmaller as well as in the larger parts of nature; in the outline and bark of a tree, as in the rude ſummit and craggy ſides of a mountain.

Let us then examine our theory by an appeal to experience, and try how far theſe qualities enter into the idea of picturesque beauty, and how far they mark that difference among objects which is the ground of our inquiry.

"A piece of Palladian architecture may be elegant in the laſt degree; the proportion of its parts, the propriety of its ornaments, and the ſymmetry of the whole, may be highly pleaſing; but if we introduce it in a picture, it immediately becomes a formal object, and ceaſes to pleaſe. Should we wiſh to give it picturesque beauty, we muſt uſe the mallet inſtead of the chiſſel; we muſt beat down one half of it, deface the other, and throw the mutilated members around in heaps; in ſhort, from a ſmooth building we muſt turn it into a rough ruin. No painter who had the choice of the two objects would heſitate a moment.

"Again, why does an elegant piece of garden-ground make no figure on canvas? the ſhape is pleaſing, the combination of the objects harmonious, and the winding of the walk in the very line of beauty. All this is true; but the ſmoothneſs of the whole, though right and as it ſhould be in nature, offends in picture. Turn the lawn into a piece of broken ground, plant rugged oaks inſtead of flowering ſhrubs, break the edges of the walk, give it the rudeneſs of a road, mark it with wheel tracks, and ſcatter around a few ſtones and bruſhwood; in a word, inſtead of making the whole ſmooth, make it rough, and you make it alſo picturesque. All the other ingredients of beauty it already poſſeſſed." On the whole, picturesque compoſition conſiſts in uniting in one whole, a variety of parts, and theſe parts can only be obtained from rough objects.

It is poſſible, therefore, to find picturesque objects among works of art, and it is poſſible to make objects ſo; but the grand ſcene of picturesque beauty is nature in all its original variety, and in all its irregular grandeur. "We ſeek it (ſays our author) among all the ingredients of landſcape, trees, rocks, broken grounds, woods, rivers, lakes, plains, valleys, mountains, and diſtances. Theſe objects in themſelves produce infinite variety; no two rocks or trees are exactly the ſame; they are varied a ſecond time by combination; and almoſt as much a third time by different lights and ſhades and other aerial effects. Sometimes we find among them the exhibition of a whole, but oftener we find only beautiful parts."

Sublimity or grandeur alone cannot make an object picturesque: for, as our author remarks, "however grand the mountain or the rocks may be, it has no claim to this epithet, unleſs its form, its colour, or its accompaniments, have ſome degree of beauty. Nothing can be more ſublime than the ocean; but wholly unaccompanied, it has little of the picturesque. When we talk therefore of a ſublime object, we always underſtand that it is alſo beautiful; and we call it ſublime or beautiful only, as the ideas of ſublimity or ſimple beauty prevail. But it is not only the form and the compoſition of the objects of landſcape which the picturesque eye examines; it connects them with the atmoſphere, and ſeeks for all thoſe various effects which are produced from that vaſt and wonderful ſtorehouſe of nature. Nor is there in travelling a greater pleaſure, than when a ſcene of grandeur burſts unexpectedly upon the eye, if accompanied with ſome accidental circumſtance of the atmoſphere which harmonizes with it, and gives it double value."

There are few places ſo barren as to afford no picturesque ſcene.

——— ————————Believe the muſe,
She does not know that unauſpicious ſpot
Where beauty is thus niggard of her ſtore.
Believe the muſe, through this terreſtrial waſte
The ſeeds of grace are ſown, profuſely ſown,
Even where we leaſt may hope.———

Mr Gilpin mentions the great military road between Newcaſtle and Carliſle as the moſt barren tract of country in England; and yet there, he ſays, there is "always ſomething to amuſe the eye. The interchangeable patches of heath and greenſward make an agreeable variety. Often too on theſe vaſt tracts of interſecting grounds we ſee beautiful lights, ſoftening off along the ſides of hills; and often we ſee them adorned with cattle, flocks of ſheep, heath-cocks, grous, plover, and flights of other wild fowl. A group of cattle ſtanding in the ſhade on the edge of a dark hill, and relieved by a lighter diſtance beyond them, will often make a complete picture without any other accompaniment. In many other ſituations alſo we find them wonderfully pleaſing, and capable of making pictures amidſt all the deficiencies of landſcape. Even a winding road itſelf is an object of beauty; while the richneſs of the heath on each ſide, with the little hillocks and crumbling earth, give many an excellent leſſon for a foreground. When we have no opportunity of examining the grand ſcenery of nature, we have everywhere at leaſt the means of obſerving with what a multiplicity of parts, and yet with what general ſimplicity, ſhe covers every ſuface.

"But if we let the imagination looſe, even ſcenes like theſe adminiſter great amuſement. The imagination can plant hills; can form rivers and lakes in valleys; can build caſtles and abbeys; and, if it find no other amuſement, can dilate itſelf in vaſt ideas of ſpace."

Mr Gilpin, after deſcribing ſuch objects as may be called picturesque, proceeds to conſider their ſources of amuſement. We cannot follow our ingenious author through the whole of this conſideration, and ſhall therefore finiſh our article with a ſhort quotation from the beginning of it. "We might begin (ſays he) in moral ſtyle, and conſider the objects of nature in a higher light than merely as amuſement. We might obſerve, that a ſearch after beauty ſhould naturally lead the mind to the great origin of all beauty; to the

——————— firſt good, firſt perfect, and firſt fair.

But though in theory this ſeems a natural climax, we inſiſt the leſs upon it, as in fact we have ſcarce ground to hope that every admirer of picturesque beauty is an admirer alſo of the beauty of virtue, and that every lover of nature reflects, that

> Nature is but a name for an *effect*,
> Whoſe *cauſe* is God.——————

If, however, the admirer of nature can turn his amuſements to a higher purpoſe; if its great ſcenes can inſpire him with religious awe, or its tranquil ſcenes with that complacency of mind which is ſo nearly allied that benevolence, it is certainly the better. *Apponat lucro.* It is ſo much into the bargain; for we dare not promiſe him more from pictureſque travel than a rational and agreeable amuſement. Yet even this may be of ſome uſe in an age teeming with licentious pleaſure; and may in this light at leaſt be conſidered as having a moral tendency."

PICUIPINIMA, is the Braſilian name of a ſpecies of pigeon, which is ſo very ſmall as ſcarcely to exceed the lark in ſize.

PICUMNUS and PILUMNUS, were two Roman deities, who preſided over the auſpices required before the celebration of nuptials. Pilumnus was ſuppoſed to patronize children, as his name ſeems in ſome manner to indicate *quod pellat mala infantiæ*. The manuring of land was firſt invented by Picumnus, from which reaſon he is called *Sterquilinius*. Pilumnus is alſo invoked as the god of bakers and millers, as he is ſaid to have firſt invented the art of grinding corn.

PICUS, the WOODPECKER, a genus of birds belonging to the order of picæ. See ORNITHOLOGY *Index*.

PICUS (fab. hiſt.), a king of Latium, ſon of Saturn. He married Venilia, alſo called Canens, by whom he had Faunus. He was tenderly loved by the goddeſs Pomona, and he returned her affection. As he was one day hunting in the woods, he was met by Circe, who became deeply enamoured of him, and who changed him into a woodpecker, called by the name of *picus* among the Latins. His wife Venilia was ſo diſconſolate when ſhe was informed of his death, that ſhe pined away. Some ſuppoſe that Picus was the ſon of Pilumnus, and that he gave out prophecies to his ſubjects by means of a favourite woodpecker; from which circumſtance originated the fable of his being metamorphoſed into a bird.

PICUS, *John Francis*, prince of Mirandola, nephew of John Pica or Picus, mentioned above, was born about the year 1469. He cultivated learning and the ſciences after the example of his uncle; but he had a principality and dominions to ſuperintend, which involved him in great troubles, and at laſt coſt him his life. He was twice driven from his principality, and twice reſtored; and at laſt, in 1533, was, together with his eldeſt ſon Albert, aſſaſſinated in his own caſtle by his nephew Galeoti. He was a great lover of letters; and ſuch of his works as were then compoſed were inſerted in the Straſburgh edition of his uncle's in 1504, and continued in future impreſſions, beſides ſome others which were never collected.

PIECE, in matters of money, ſignifies ſometimes the ſame thing with ſpecies; and ſometimes, by adding the value of the pieces, it is uſed to expreſs ſuch as have no other particular name. For the piece of eight, or piaſtre, ſee *MONEY Table*.

PIECE, is alſo a kind of money of account, or rather manner of accounting, uſed among the negroes on the coaſt of Angola in Africa. See *MONEY Table*.

PIECE, in *Heraldry*, denotes an ordinary or charge. The honourable pieces of the ſhield are the chief, feſs, bend, pale, bar, croſs, ſaltier, chevron, and in general all thoſe which may take up one-third of the field, when alone, and in what manner ſoever it be. See HERALDRY.

PIECES, in the military art, include all ſorts of great guns and mortars. Battering pieces are the larger ſort of guns uſed at ſieges for making the breaches; ſuch are the 24-pounder and culverine, the one carrying a 24 and the other an 18 pound ball. Field-pieces are 12-pounds, demiculverines, 6-pounders, ſackers, minions, and 3-pounders, which march with the army, and encamp always behind the ſecond line, but in day of battle are in the front. A ſoldier's firelock is likewiſe called his *piece*.

PIEDMONT, a country of Italy, having formerly the title of a principality, is bounded on the north by Savoy and Italy; on the weſt by France; on the ſouth by the Mediterranean and the republic of Genoa; and on the eaſt by the duchies of Montferrat and Milan; extending about 150 miles from north to ſouth, but much leſs from eaſt to weſt. It is called Piedmont, and in Latin *Piedmontium*, from its ſituation at the foot of the mountains, or Alps, which ſeparate France from Italy. This country is in ſome parts mountainous, but is everywhere very fruitful. The plains produce fine corn, and Montferrat and the Milaneſe yield great quantities of Turkey wheat, which commonly ſerves for bread, and with which the people of the middle rank mix rye; the pods are uſed for fuel, and the ſtalks being thick ſerve to mend the roads. The hills produce plenty of wine, which, like the Italian wines, is very luſcious when new, eſpecially the white. There is alſo a tartiſh red wine called *vino bruſco*, ſaid to be very wholeſome for fat people, and, on the other hand, the ſweet wine is recommended as a ſtomachic. The neighbourhood of Turin is famous for its fine fruits, and many long walks of cheſnut and mulberry trees, which produce both pleaſure and profit. Marons, or large cheſnuts, are a favourite dainty among the common people. Theſe are put into an oven, and, when thoroughly hot, and cooled in red wine, are dryed a ſecond time in the oven, and afterwards eaten cold. Truffles grow here in ſuch abundance, that Piedmont has obtained the name of the *truffle country*. Some are black, others white marbled with red. Their price is rated according to their ſize. Sometimes they are found of 12 or 14 pounds weight; and many country people earn from 60 to 70 dollars a-year merely by digging for them. The trade in cattle is ſaid to bring into Piedmont no leſs than three millions of livres per annum. The cultivation of ſilk is alſo a profitable article, the Piedmonteſe ſilk being, on account of its fineneſs and ſtrength, eſteemed the beſt in Italy. The Piedmonteſe gentry breed vaſt numbers of ſilk-worms under the care of their tenants, who have the eggs and mulberry leaves delivered to them, and in return they give half the ſilk to their maſters. This principality comprehends eleven ſmall provinces: Piedmont proper, the valleys between France and Italy, the valley of Saluza, the county of Nice, the marquiſate of Suſa, the duchy of Aoſt, the Canaveſe, the lordſhip of Vetſail, Piedmont.

ſail, the county of Aſt, and the Langes. It was formerly a part of Lombardy, but now belongs to the king of Sardinia, and lies at the foot of the Alps, which ſeparate France from Italy. It contains many high mountains, among which there are rich and fruitful valleys, as pleaſant and populous as any part of Italy. In the mountains are mines of ſeveral kinds, and the foreſts afford a great deal of curious game, among which the *tumor* is an uſeful animal. "The mules (ſays Mr Watkins) are very fine in this country; but the inhabitants have other beaſts, or rather monſters which they find very ſerviceable, though vicious and obſtinate. Theſe are produced by a cow and an aſs, or mare and bull, and called *jumarres* or *gimerri* (A). I cannot ſay that I have ever ſeen any of them, but I am told they are very common."

The Piedmonteſe are ſaid to be more intelligent than the Savoyards, but leſs ſincere. Some authors repreſent them as lively, artful, and witty, the inhabitants of the mountain of Aoſta excepted, who are farther diſtinguiſhed by large wens, as even their horſes, dogs, and other animals. Mr Baretti, however, in his *Account of Italy*, vol. ii. p. 116. gives the following account of them. "One of the chief qualities (ſays he), which diſtinguiſh the Piedmonteſe from all other Italians, is their want of cheerfulneſs. Piedmont never produced a ſingle good poet, as far as the records of the country can go, whereas there is no other province of Italy but what can boaſt of ſome poet ancient or modern; and yet the Piedmonteſe are not deficient in ſeveral branches of learning, and ſome of them have ſucceeded tolerably well in civil law, phyſic, and the mathematics. It is likewiſe obſerved of this people, that none of them ever attained to any degree of excellence in the polite arts, and it is but lately that they can boaſt of a painter, Cavaliero Bomente; a ſtatuary, Signor Lodetto; and ſome architects, Conte Alfieri, Signor Borra, and others, who yet, to ſay the truth, are far inferior to numberleſs artiſts produced by the other provinces of Italy. They have, on the other hand, greatly advanced when conſidered as ſoldiers; though their troops have never been very numerous, every body converſant in hiſtory knows the brave ſtand they made for ſome centuries paſt againſt the French, Spaniards, and Germans, whenever they have been invaded by theſe nations. The ſkill of the Piedmonteſe in fortification is likewiſe very great, and their Bertolas and Pintos have ſhown as much genius as the Vaubans and Cohorns, in rendering impregnable ſeveral places which inferior engineers would only have made ſecure."

Payne's Geog. vol. ii.

The chief trade of this principality conſiſts in hemp and ſilk. Indeed, ſo great is their trade in raw ſilk, that the Engliſh alone have purchaſed to the value of 200,000 lib. in a year. The ſilk worm thrives ſo well, that many peaſants make above (B) 100 lib. of ſilk annually, and it is not only abundant, but univerſally known to be ſtronger and finer than any in Italy. The land owners divide the profit with their tenants. The Piedmonteſe workmen, however, are ſaid to want expertneſs, though they finiſh their work equally well with thoſe of other nations. The high duty and land carriage on mules likewiſe tend to leſſen the value of this trade. They have beſides corn, rice, wine, fruits, flax, and cattle.

Piedmont
Pienes.

In the valleys of Lucerne, Peyrouſe, and St Martin, which have always belonged to Piedmont, live the celebrated Waldenſes or Vaudois, a name which ſignifies *people of the valleys*. Theſe have rendered themſelves famous in hiſtory for their diſſent from the Romiſh church long before the time of Luther and Calvin, and for the perſecutions they have ſuffered on that account; but ſince the year 1730 they have not been openly moleſted for their religion, but, in order to ſuppreſs them by degrees, a popiſh church has been built in every pariſh. They are heavily taxed, and labour under great oppreſſions. The number of people in theſe valleys ſcarce at preſent exceeds 10,000, of which 1000 are Catholics. The chief river of Piedmont is the Po, which flows out of Mount Viſo. The river Seſia, the Doria, Baltea, the ancient Druria, the Tenaro, and ſeveral others, run into it. The Var, anciently called the Varus, riſes in the county of Nice, and after watering it empties itſelf into the Mediterranean. The language of the Piedmonteſe is a mixture of French and Italian. In this country are about 50 earldoms, 15 marquiſates, a multitude of lordſhips, and 20 abbeys. Though the country be entirely popiſh, except ſome valleys inhabited by the Waldenſes, the king reſerves to himſelf the greateſt part of the power in church affairs, which in many other places is given up to the pope, and the conſtitution *unigenitus* is here univerſally oppoſed. Towards the end of the 17th century, the French king perſuaded the duke of Savoy to drive them out of the country; in conſequence of which 200,000 of them retired to Germany, England, and Holland, and yet they are not all extirpated, though, as we have obſerved, they are obliged to have a Roman Catholic church in every pariſh.

Turin, formerly the reſidence of the king of Sardinia, to whom this principality belonged, is the chief city. See TURIN. The number of inhabitants, Mr Watkins ſays, in Piedmont and Savoy, amount to 2,695,727 ſouls, of which Turin contains about 77,000. Piedmont, as well as the reſt of Italy, few of our readers need be informed, is now ſubject to the overgrown power of France.

PIENES, a ſmall iſland of Japan, oppoſite to the harbour of Saccai, is famed not only for the beauty of its walks, to which crowds of people reſort from the city, but for a deity worſhipped there, to which vaſt numbers of perſons devote themſelves. They go from his temple to the ſea ſide, where they enter into a boat provided

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(A) Theſe equivocal animals, however, if we may ſo term them, are ſo generally mentioned by travellers in this part of Europe, that we have no doubt of their exiſtence, or of their being found hardy and ſerviceable as labourers.

(B) Each pound is valued in Piedmont at 18s. The little village of La Tour, in the valley of Lucerne, raiſes above 50,000 lb. annually, and the exports every year to the ſingle city of Lyons amount to more than [illegible] Sterling.

[illegible]

provided for the purpoſe; then, launching into the deep, they throw themſelves overboard, loaded with ſtones, and ſink to the bottom. The temple of that deity, which is called [illegible], is very large and lofty, and ſo are many others in the city itſelf; one in particular, dedicated to the gods of other countries, is thought the fineſt in the whole empire.

PIEPOUDRE, Court of, the loweſt, and at the ſame time the moſt expeditious, court of juſtice known to the law of England. It is called PIEPOUDRE, (*curia pedis pulverizati*), from the duſty feet of the ſuitors; or, according to Sir Edward Coke, becauſe juſtice is there done as ſpeedily as duſt can fall from the foot: Upon the ſame principle that juſtice among the Jews was adminiſtered in the gate of the city, that the proceedings might be the more ſpeedy, as well as public. But the etymology given us by a learned modern writer is much more ingenious and ſatisfactory; it being derived, according to him, from *pied puldreaux*, "a pedlar," in old French, and therefore ſignifying the court of ſuch petty chapmen as reſort to fairs or markets. It is a court of record incident to every fair and market; of which the ſteward of him who owns or has the toll of the market is the judge. It was inſtituted to adminiſter juſtice for all commercial injuries done in that very fair or market, and not in any preceding one. So that the injury muſt be done, complained of, heard, and determined, within the compaſs of one and the ſame day, unleſs the fair continues longer. The court hath cognizance of all matters of contract that can poſſibly ariſe within the precinct of that fair or market; and the plaintiff muſt make oath that the cauſe of an action aroſe there. From this court a writ of error lies, in the nature of an appeal, to the courts at Weſtminſter. The reaſon of its inſtitution ſeems to have been, to do juſtice expeditiouſly among the variety of perſons that reſort from diſtant places to a fair or market; ſince it is probable, that no other inferior court might be able to ſerve its proceſs, or execute its judgements, on both or perhaps either of the parties; and therefore, unleſs this court had been erected, the complaint muſt neceſſarily have reſorted even in the firſt inſtance to ſome ſuperior judicature.

PIER, in building, denotes a maſs of ſtone, &c. oppoſed by way of fortreſs to the force of the ſea, or a great river, for the ſecurity of ſhips that lie at harbour in any haven.

Piers of a Bridge. See BRIDGE.

PIERCEA. See RIVINIA.

PIERIA, in *Ancient Geography*, a diſtrict of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the river Axios on the north, and on the ſouth no farther than the Aliacmon, along the weſt ſide of the Sinus Thermaicus.—Another *Pieria* of Syria, the north part of Seleucia, or the *Antiochena*, ſituated on the Sinus Iſſicus, and lying next Cilicia to the north-weſt.

PIERIDES, in fabulous hiſtory, the daughters of Pierus a Macedonian prince, preſuming to diſpute with the muſes for the prize of poetry, were turned into magpies. The name of *Pierides* was alſo given to the muſes, from Mount Pieris in Theſſaly, which was conſecrated to them; or, according to others, from Pieris, a Theſſalian poet, who was the firſt who ſacrificed to them. See PIERIS.

Pierino ‖ Pierre.

PIERINO DEL VAGA, an eminent Italian painter, born of poor parents in Tuſcany, about the year 1500. He was placed apprentice with a grocer in Florence, and got ſome inſtructions from the painters to whom he was ſent with colours and pencils; but a painter named *Vaga* taking him to Rome, he was called *Del Vaga*, from living with him, his real name being *Buanacorſi*. He ſtudied anatomy with the ſciences neceſſary for his profeſſion; and had ſomewhat of every thing that was good in his compoſitions. After Raphael's death, he joined with Julio Romano and Franciſco Penni to finiſh the works in the Vatican which were left imperfect by their common maſter; and to confirm their friendſhip married Penni's ſiſter. He gained the higheſt reputation by his performances in the palace of Prince Doria at Genoa: but the multiplicity of his buſineſs, and the vivacity of his imagination, drained his ſpirits in the flower of his age; for he died in the year 1547. Of all Raphael's diſciples, Pierino kept the character of his maſter longeſt, i. e. his exterior character and manner of deſigning; for he fell very ſhort of the fineneſs of Raphael's thinking. He had a particular genius for the decoration of places according to their cuſtoms. His invention in that kind of painting was full of ingenuity; grace and order are everywhere to be met with, and his diſpoſitions, which are ordinary in his pictures, are wonderful in his ornaments: ſome of theſe he has made little, and ſome great, and placed them both with ſo much art, that they ſet off one another by compariſon and contraſt. His figures are diſpoſed and deſigned according to Raphael's guſto; and if Raphael gave him at firſt ſome ſlight ſketches of ornaments, as he did to Giovanni d'Udine, he executed them to admiration. The tapeſtries of the ſeven planets, in ſeven pieces, which Pierino deſigned for Diana de Poitiers, and which were, when De Piles wrote, with Monſieur the firſt preſident at Paris, ſhows ſufficiently what he was, and that the above character does not exceed the truth.

PIERIS, in *Ancient Geography*, a mountain which is thought to have given name to Pieria of Macedonia; taking its name from Pierus a poet, who was the firſt that ſacrificed to the Muſes, thence called *Pierides*, if credit may be given to an ancient ſcholiaſt on Juvenal.

PIERRE D'AUTOMNE is a French name, tranſlated from the Chineſe, of a medicinal ſtone, celebrated in the eaſt for curing all diſorders of the lungs. Many imagine it had its name of the autumn-ſtone from its being only to be made at that ſeaſon of the year; but it may certainly be made equally at all times. The Chineſe chemiſts refer the various parts of the body to the ſeveral ſeaſons of the year, and thus they refer the lungs to autumn. This is evident in their writings, and thus the ſtone for diſeaſes of the lungs came to be called *autumn ſtone*. Is is prepared as follows: They put 30 pints of the urine of a ſtrong and healthy young man into a large iron pot, and ſet it over a gentle fire. When it begins to boil, they add to it, drop by drop, about a large tea-cup-full of rape oil. They then leave it on the fire till the whole is evaporated to a thick ſubſtance like black mud. It is then taken out of the pot, and laid on a flat iron to dry, ſo that it may be powdered very fine. This powder is moiſtened with freſh oil, and the maſs is put into a double crucible, ſurrounded with coals, where it ſtands till it be thoroughly dried again. This is again powdered, and put into a china veſſel, which being covered with ſilk cloth and a double paper, they pour on it boiling water, which makes its way, drop by drop, through theſe coverings, till ſo much is got in as is ſufficient to reduce it to a paſte. This paſte is well mixed together in the veſſel it is kept in, and this is put into a veſſel of water, and the whole ſet over the fire. The matter thus becomes again dried in *balneo mariæ*, and is then finiſhed. *Obſerv. ſur les Cout. de l'Aſie*, p. 258.

Pierre, *St*, is a large river in North America, ſcarcely inferior to the Rhine or the Danube, and navigable almoſt to its ſource. Together with many other large ſtreams, it falls into the great river Miſſiſſippi.

Pierre, *St*, or *St Peter's*, the capital of Martinico, was built in 1665, in order to overawe the mutineers of the iſland who rebelled againſt its proprietors, the ſecond Weſt India company, who were at the ſame time the proprietors of all the French Antilles. It is ſituated on the weſtern ſide of the iſland. The town extends along the ſhore, and a battery that commands the road is erected on the weſt ſide, which is waſhed by the river Royolan, or St Peter. The town is divided into three wards; the middle, which is properly St Peter's, begins at the fort, and runs weſtward to the battery of St Nicholas. Under the walls of the ſecond ward ſhips at anchor ride more ſecurely than under the fort, on which account this ward is called the *Anchorage*. The third ward, called the *Gallery*, extends along the ſea ſide from Fort St Peter to the Jeſuits River, and is the moſt populous part of the city. The houſes of St Peter's ward are neat, commodious, and elegant, particularly thoſe of the governor of the iſland, the intendant, and the other officers. The pariſh church of St Peter is a magnificent ſtone building which belonged to the Jeſuits, with a noble front of the Doric order. The church of the Anchorage, which belongs to the Jacobine friars, is likewiſe of ſtone. It is a place of conſiderable trade, and is built with tolerable regularity. The houſes are moſtly conſtructed of a gray pumice-ſtone or lava, which is found on the ſtrand; and the high-ſtreet is, according to Dr Iſert, above an Engliſh mile in length. It is ſuppoſed to contain about 2000 houſes, and 30,000 inhabitants, including negroes. St Pierre, with the whole of the flouriſhing iſland of Martinico, was taken from the French in the month of March 1794, by the Britiſh troops: 125 veſſels loaded with the produce of the iſland, and of great value, were captured, 71 of which were in the harbour of St Pierre.

PIETISTS, a religious ſect, ſprung up among the Proteſtants of Germany, ſeeming to be a kind of mean between the Quakers of England and the Quietiſts of the Romiſh church. They deſpiſe all ſorts of eccleſiaſtical polity, all ſchool theology, and all forms and ceremonies, and give themſelves up to contemplation and the myſtic theology. Many groſs errors are charged on the Pietiſts, in a book entitled *Manipulus Obſervationum Antipietiſticarum*; but they have much of the air of polemical exaggeration, and are certainly not at all juſt. Indeed there are Pietiſts of various kinds: Some running into groſs illuſions, and carrying their errors to the overturning of a great part of the Chriſtian doctrine, while others are only viſionaries; and others are very honeſt and good, though perhaps miſguided, people. They have been diſguſted with the coldneſs and formality of other churches, and have thence become charmed with the fervent piety of the Pietiſts, and attached to their party. without giving into the groſſeſt of their errors. See *Moſheim's Eccl. Hiſtory*, vol. iv. p. 454.

Pietists, otherwiſe called the *Brethren and Siſters of the Pious and Chriſtian Schools*, a ſociety formed in the year 1678 by Nicholas Barre, and obliged by their engagements to devote themſelves to the education of poor children of both ſexes.

PIETOLA, anciently called *Andes*, is a place within two Italian miles of Mantua, famous for being the birthplace of Virgil.

PIETY, is a virtue which denotes veneration for the Deity, and love and tenderneſs to our friends. This diſtinguiſhed virtue, like many others, received among the Romans divine honours, and was made one of their gods. Acilius Glabrio firſt erected a temple to this divinity, which he did upon the ſpot on which a woman had fed with her own milk her aged father, who had been impriſoned by order of the ſenate, and deprived of all aliments. The ſtory is well known, and is given at length in authors which are in the hands of every ſchoolboy. See *Cicero de div.* I. and *Valerius Maximus*, v. c. 4. and our article *FILIAL Piety*.

If piety was thus practiſed and thus honoured in Heathen antiquity, it ſurely ought not to be leſs ſo, among Chriſtians, to whom its nature is better defined, and to the practice of which they have motives of greater cogency. A learned and elegant writer has ſaid that the want of piety ariſes from the want of ſenſibility; and his obſervations and arguments are ſo juſt and ſo well expreſſed, that we cannot do better than tranſcribe them.

"It appears to me (ſays Dr Knox), that the mind of man, when it is free from natural defects and acquired corruption, feels no leſs a tendency to the indulgence of devotion than to virtuous love, or to any other of the more refined and elevated affections. But debauchery and exceſs contribute greatly to deſtroy all the ſuſceptible delicacy with which nature uſually furniſhes the heart; and, in the general extinction of our better qualities, it is no wonder that ſo pure a ſentiment as that of piety ſhould be one of the firſt to expire.

"It is certain that the underſtanding may be improved in a knowledge of the world, and in the arts of ſucceeding in it, while the heart, or whatever conſtitutes the ſeat of the moral and ſentimental feelings, is gradually receding from its proper and original perfection. Indeed experience ſeems to evince, that it is hardly poſſible to arrive at the character of a complete man of the world, without loſing many of the moſt valuable ſentiments of uncorrupted nature. A complete man of the world is an artificial being; he has diſcarded many of the native and laudable tendencies of his mind, and adopted a new ſyſtem of objects and propenſities of his own creation. Theſe are commonly groſs, coarſe, ſordid, ſelfiſh, and ſenſual. All, or either of theſe attributes, tend directly to blunt the ſenſe of every thing liberal, enlarged, diſintereſted; of every thing which participates more of an intellectual than of a ſenſual nature. When the heart is tied down to the earth by luſt and avarice, it is not extraordinary that the eye ſhould be ſeldom lifted up to heaven. To the man who ſpends his Sunday (becauſe he thinks the day fit for little elſe) in the counting-houſe, in travelling, in the tavern, or in the brothel, thoſe who go to church appear as fools, and the buſineſs they go upon as nonſenſe. He is callous to the feelings of devotion; but he is tremblingly alive to all that gratifies his ſenſes or promotes his intereſt.

"It has been remarked of thoſe writers who have attacked Chriſtianity, and repreſented all religions merely as diverſified modes of ſuperſtition, that they were indeed, for the moſt part, men of a metaphyſical and a diſputatious turn of mind, but uſually little diſtinguiſhed for benignity and generoſity. There was, amidſt all their pretenſions to logical ſagacity, a cloudineſs of ideas, and a coldneſs of heart, which rendered them very unfit judges on a queſtion in which the heart is chiefly intereſted; in which the language of nature is more expreſſive and convincing, than all the dreary ſubtleties of the diſmal metaphyſicians. Even the reaſoning faculty, on which we ſo greatly value ourſelves, may be perverted by exceſſive refinement; and there is an abſtruſe, but vain and fooliſh philoſophy, which philoſophizes us out of the nobleſt parts of our noble nature. One of thoſe parts of us is our inſtinctive ſenſe of religion, of which not one of thoſe brutes which the philoſophers moſt admire, and to whoſe rank they wiſh to reduce us, is found in the ſlighteſt degree to participate.

"Such philoſophers may be called, in a double ſenſe, the enemies of mankind. They not only endeavour to entice man from his duty, but to rob him of a moſt exalted and natural pleaſure. Such, ſurely, is the pleaſure of devotion. For when the ſoul riſes above this little orb, and pours its adoration at the throne of celeſtial majeſty, the holy fervour which it feels is itſelf a rapturous delight. Neither is this a declamatory repreſentation, but a truth felt and acknowledged by all the ſons of men; except thoſe who have been defective in ſenſibility, or who hoped to gratify the pride or the malignity of their hearts by ſingular and pernicious ſpeculation.

"Indeed all diſputatious, controverſial, and metaphyſical writings on the ſubject of religion, are unfavourable to genuine piety. We do not find that the moſt renowned polemics in the church militant were at all more attentive than others to the common offices of religion, or that they were actuated by any peculiar degree of devotion. The truth is, their religion centered in their heads, whereas its natural region is the heart. The heart! confined, alas! in colleges or libraries, unacquainted with all the tender charities of huſband, father, brother, friend; ſome of them have almoſt forgotten that they poſſeſs a heart. It has long ceaſed to beat with the pulſations of love and ſympathy, and has been engroſſed by pride on conquering an adverſary in the ſyllogiſtic combat, or by impotent anger on a defeat. With ſuch habits, and ſo defective a ſyſtem of feelings, can we expect that a doctor of the Sorbonne, or the diſputing profeſſor of divinity, ſhould ever feel the pure flame of piety that glowed in the boſoms of Mrs Rowe, Mrs Talbot, or Mr Nelſon?

"It is however certain, that a devotional taſte and habit are very deſirable in themſelves, excluſive of their effects in meliorating the morals and diſpoſition, and promoting preſent and future felicity. They add dignity, pleaſure, and ſecurity to any age: but to old age they are the moſt becoming grace, the moſt ſubſtantial ſupport, and the ſweeteſt comfort. In order to preſerve them, it will be neceſſary to preſerve our ſenſibility; and nothing will contribute ſo much to this purpoſe as a life of temperance, innocence, and ſimplicity."

Of piety, as it denotes love and tenderneſs to our friends, there have been many diſtinguiſhed inſtances both in ancient and modern times. See *FILIAL Piety*, *FRATERNAL* and *PARENTAL Affection*, &c.

The following example of filial piety in China, taken from P. Du Halde's deſcription of that country, will not we truſt be diſagreeable to our readers. "In the commencement of the dynaſty of the Tang, Lou-tao-tſong, who was diſaffected to the government, being accuſed of a fault, which touched his life, obtained leave from thoſe who had him in cuſtody, to perform the duties of the Tao to one of his deceaſed friends. He managed matters ſo well, that giving his keepers the ſlip, he fled to the houſe of Lou Nan-kin, with whom he had a friendſhip, and there hid himſelf. Lou Nan-kin, notwithſtanding the ſtrict ſearch that was made, and the ſeverity of the court againſt thoſe who conceal priſoners that have eſcaped, would not betray his friend. However, the thing coming to be diſcovered, Lou Nan-kin was impriſoned; and they were juſt on the point of proceeding againſt him, when his younger brother preſenting himſelf before the judge, *It is I, Sir*, ſaid he, *who have hidden the priſoner; it is I who ought to die, and not my elder brother*. The eldeſt maintained, on the contrary, that his younger brother accuſed himſelf wrongfully, and was not at all culpable. The judge, who was a perſon of great ſagacity, ſifted both parties ſo effectually, that he not only diſcovered that the younger brother was innocent, but even made him confeſs it himſelf: *It is true, Sir*, ſaid the younger all in tears, *I have accuſed myſelf falſely; but I have very ſtrong reaſons for ſo doing. My mother has been dead for ſome time, and her corpſe is not yet buried; I have a ſiſter alſo who is marriageable, but is not yet diſpoſed of: theſe things which my brother is capable of managing, I am not, and therefore deſire to die in his ſtead. Vouchſafe to admit my teſtimony*. The commiſſioner gave an account of the whole affair to the court, and the emperor at his ſolicitation pardoned the criminal."

PIG, ſee SUS, } MAMMALIA *Iudex*.
Guinea-PIG, ſee MUS, }

PIG of lead, the eighth part of a fother, amounting to 250 pounds weight.

PIGANIOL DE LA FORCE, JOHN AYMAR DE, a native of Auvergne, of a noble family, applied himſelf with ardour to the ſtudy of geography and of the hiſtory of France. With the view of improving himſelf in this ſtudy, he travelled into different provinces; and, in the courſe of his travels, made ſome important obſervations on the natural hiſtory, the commerce, the civil and eccleſiaſtical government of each province. Theſe obſervations were of great uſe to him in compiling the works he has left behind him, of which the chief are, 1. An Hiſtorical and Geographical Deſcription of France; the largeſt edition of which is that of 1753, in 15 vols. 12mo. It is the beſt work which has hitherto appeared upon that ſubject, though it contains a great number of inaccuracies and even errors. 2. A Deſcription of Paris, in 10 vols. 12mo; a work equally entertaining and inſtructive, and much more complete than the deſcription given by Germain Brice: beſides, it is written with an elegant ſimplicity. He publiſhed an abridgement of it in 2 vols.

12mo. 3. A Deſcription of the Caſtle and Park of Verſailles, Marly, &c. in 2 vols. 12mo: it is very amuſing, and pretty well executed. Piganiol had alſo a concern with Abbé Nadal in the journal of Trevoux. He died at Paris in February 1753, at the age of 80 years. This learned man was as much to be reſpected for his manners as for his talents. To a profound and varied knowledge he united great probity and honour, and all the politeneſs of a courtier.

PIGEON, ſee Columba, Ornithology *Index*.

Pigeon-Houſe is a houſe erected full of holes within, for the keeping, breeding, &c. of pigeons, otherwiſe called a *dove-cot*.

Any lord of manor may build a pigeon-houſe on his land, but a tenant cannot do it without the lord's licence. When perſons ſhoot at or kill pigeons within a certain diſtance of the pigeon-houſe, they are liable to pay a forfeiture.

In order to erect a pigeon-houſe to advantage, it will be neceſſary, in the firſt place, to pitch upon a convenient ſituation; of which none is more proper than the middle of a ſpacious court-yard, becauſe pigeons are naturally of a timorous diſpoſition, and the leaſt noiſe they hear frightens them. With regard to the ſize of the pigeon-houſe, it muſt depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too little; and as to its form, the round ſhould be preferred to the ſquare ones; becauſe rats cannot ſo eaſily come at them in the former as in the latter. It is alſo much more commodious; becauſe you may, by means of a ladder turning upon an axis, eaſily viſit all the neſts in the houſe, without the leaſt difficulty; which cannot ſo eaſily be done in a ſquare houſe. In order to hinder rats from climbing up the outſide of the pigeon-houſe, the wall ſhould be covered with tin plates to a certain height, about a foot and a half will be ſufficient; but they ſhould project out three or four inches at the top, to prevent their clambering any higher.

The pigeon-houſe ſhould be placed at no great diſtance from water, that the pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholeſome in cold weather. The boards that cover the pigeon-houſe ſhould be well joined together, ſo that no rain may penetrate through it: and the whole building ſhould be covered with hard plaſter, and white-waſhed within and without, white being the moſt pleaſing colour to pigeons. There muſt be no window, or other opening in the pigeon-houſe to the eaſtward; theſe ſhould always face the ſouth, for pigeons are very fond of the ſun, eſpecially in winter.

The neſts or covers in a pigeon-houſe ſhould conſiſt of ſquare holes made in the walls, of a ſize ſufficient to admit the cock and hen to ſtand in them. The firſt range of theſe neſts ſhould not be leſs than four feet from the ground, that the wall underneath being ſmooth, the rats may not be able to reach them. Theſe neſts ſhould be placed in quincunx order, and not directly over one another. Nor muſt they be continued any higher than within three feet of the top of the wall: and the upper row ſhould be covered with a board projecting a conſiderable diſtance from the wall, for fear the rats ſhould find means to climb the outſide of the houſe.

M. Duhamel thinks that pigeons neither feed upon the green corn, nor have bills ſtrong enough to ſearch for its ſeeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the ſun. "From the time of the ſprouting of the corn, ſays he, pigeons live chiefly upon the ſeeds of wild uncultivated plants, and therefore leſſen conſiderably the quantity of weeds that would otherwiſe ſpring up; as will appear from a juſt eſtimate of the quantity of grain neceſſary to feed all the pigeons of a well-ſtocked dove-houſe." But Mr Worlidge and Mr Liſle are ſtrenuous in ſupport of the contrary opinion. The latter relates, that a farmer in his neighbourhood aſſured him he had known an acre ſowed with peaſe, and rain coming ſo that they could not be harrowed in, every pea was fetched away in half a day's time by pigeons. And the former ſays, "It is to be obſerved, that where the flight of pigeons falls, there they fill themſelves and away, and return again where they firſt roſe, and ſo proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have ſeen them lie ſo much upon a piece of about two or three acres ſown with peaſe, that they devoured at leaſt three parts in four of the ſeed, which, I am ſure, could not be all above the ſurface of the ground. That their ſmelling is their principal director, I have obſerved; having ſown a ſmall plat of peaſe in my garden, near a pigeon-houſe, and covered them ſo well that not a pea appeared above ground. In a few days, a parcel of pigeons were hard at work in diſcovering this hidden treaſure: and in a few days more I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithſtanding they were hid in, and well covered. Their ſmelling alone directed them, as I ſuppoſed, becauſe they followed the ranges exactly. The injury they do at harveſt on the peaſe, vetches, &c. is ſuch that we may rank them among the greateſt enemies the poor huſbandman meets withal; and the greater, becauſe he may not erect a pigeon-houſe, whereby to have a ſhare of his own ſpoils; none but the rich being allowed this privilege, and ſo ſevere a law being alſo made to protect theſe winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy againſt them, but to affright them away by noiſes or ſuch like. You may, indeed, ſhoot at them; but you muſt not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houſes, they cannot bolt or fly out of the tops of them, but by the ſtrength of their tails; after the thus weakening of which, they remain priſoners at home."

Mr Worlidge's impounding the pigeons reminds us of a humorous ſtory of a gentleman, who, upon a neighbouring farmer's complaining to him, that his pigeons were a great nuiſance to his land, and did ſad miſchief to his corn, replied jokingly, Pound them, if you catch them treſpaſſing. The farmer, improving the hint, ſteeped a parcel of peaſe in an infuſion of *coculus indicus*, or ſome other intoxicating drug, and ſtrewed them upon his grounds. The pigeons ſwallowed them, and ſoon remained motionleſs on the field: upon which the farmer threw a net over them, incloſed them in it, and carried them to an empty barn, from whence he ſent the gentleman word that he had followed his directions with regard to the pounding of his pigeons, and deſired him to come and releaſe them.

Carrier-PIGEON. See *CARRIER-Pigeon* and COLUMBA, ORNITHOLOGY *Index*.

PIGEON, *Peter Charles Francis*, curate of St Peter du Regard, in the dioceſe of Bayeux, was one of the prieſts lately belonging to the king's houſe at Wincheſter. He was born in Lower Normandy, of honeſt and virtuous parents, and of a decent fortune. His inclinations early led him to embrace the eccleſiaſtical ſtate, from which neither the ſolicitations of his friends, nor the proſpect of a more ample fortune on the death of his elder brother, could withdraw him. Several of his ſchoolfellows and maſters, who are now reſident in the king's houſe at Wincheſter, bear the moſt ample teſtimony to his aſſiduity, regularity, piety, and the ſweetneſs of his diſpoſition, during the whole courſe of his education. The ſweetneſs of temper, in particular, was ſo remarkable, and ſo clearly depicted on his countenance, as to have gained him the eſteem and affection of ſuch of the inhabitants of Wincheſter as by any means had become acquainted with him. He was ſeven years employed in quality of vicar, or, as we ſhould call it, *curate*, of a large pariſh in the dioceſe of Seez, where his virtues and talents had ample ſcope for exertion. His practice was to riſe at five o'clock every morning, and to ſpend the whole time till noon (the uſual time of dining for perſons in his ſtation) in prayer and ſtudy. The reſt of the day, till evening, he devoted to viſiting the ſick, and other exterior duties of his function. In 1789, the year of the French revolution, M. Pigeon was promoted to a curacy, or rather a rectory, in the dioceſe of Bayeux, called the *pariſh of St Peter du Regard*, near the town of Condè ſur Noereau. It was eaſy for him to gain the good-will and the protection of his pariſhioners; but a Jacobin club in the above-mentioned town ſeemed to have no other ſubject to deliberate upon than the various ways of haraſſing and perſecuting M. Pigeon and certain other prieſts in the neighbourhood, who had from motives of conſcience refuſed the famous civic oath. It would be tedious to relate the many cruelties which were at different times exerciſed upon him, and the imminent danger of loſing his life to which he was expoſed, by the blows that were inflicted on him, by his being thrown into water, and being obliged to wander in woods and other ſolitary places, without any food or place to lay his head, in order to avoid his perſecutors. We may form ſome judgement of the ſpirit of his perſecutors from the following circumſtance. Being diſappointed on a particular occaſion in the ſearch they were making after M. Pigeon, with the view of amuſing themſelves with his ſufferings, they made themſelves amends by ſeizing his mother, a reſpectable lady of 74 years of age, and his two ſiſters, whom they placed upon aſſes with their faces turned backwards, obliging them in deriſion to hold the tails of theſe animals. Thus they were conducted in pain and ignominy throughout the whole town of Condè, for no other alleged crime except being the neareſt relations of M. Pigeon. At length the decree for tranſporting all the eccleſiaſtics arrived; and this gentleman, with ſeveral others, after having been ſtripped of all their money, was ſhipped from Port Beſſin, and landed at Portſmouth, where he was ſhortly after received into the eſtabliſhment at Foxton, and, upon that being diſſolved in order to make room for priſoners of war, into the king's houſe at Wincheſter. Being of a ſtudious turn, he was accuſtomed, as many of his brethren alſo were, to betake himſelf to the neighbouring lanes and thickets for the ſake of greater ſolitude. With this view having, about ten o'clock in the morning, Aug. 28. 1793, retired to a certain little valley, on the north-eaſt ſide of a place called *Oram's Arbour*, the ſame place where the county elections for Hampſhire are held, he was there found, between three and four o'clock in the afternoon, murdered, with the upper part of his ſkull abſolutely broken from the lower part, and a large hedge-ſtake, covered with blood, lying by him, as were the papers on which he had been tranſcribing a manuſcript ſermon, with the hearing of which he had been much edified, and the ſermon itſelf which he was copying, together with his pen, imbrued in blood. His watch was carried away, though part of the chain, which had by ſome means been broken, was left behind. He was writing the word *paradiſe*, the laſt letters of which remained unwritten when the fatal blow was given him, which appears evidently to have been diſcharged upon him from a gap in a hedge which was immediately behind him. At firſt the ſuſpicion of this cruel murder fell upon the French democrats, who, to the number of 200, are priſoners of war, at the neighbouring town of Alresford, as one of that number, who had broken his parole, had, about three weeks before, been taken up in Wincheſter, and both there and at Alresford had repeatedly threatened to murder his uncle, a prieſt, whom he underſtood to be then at Wincheſter, not without fervent wiſhes of having it in his power to murder the whole eſtabliſhment, conſiſting of more than 600 perſons. However, as no French priſoner was ſeen that day in the neighbourhood of Wincheſter, as none of them were known to have left Alresford, it is evidently reaſonable to acquieſce in the verdict of the coroner; namely, that the murder was committed by a perſon or perſons unknown. The moſt noble marquis of Buckingham, whoſe munificence and kindneſs to thoſe conſcientious exiles, the emigrant French clergy, can only be conceived by thoſe who have been witneſſes of the ſame, with the truly reſpectable corps of the Buckinghamſhire militia, then quartered at Wincheſter, joined in paying the laſt mark of reſpect to the unfortunate deceaſed, by attending his funeral, which was performed at the Roman Catholic burying-ground, called *St James's*, near the ſaid city, on Saturday, Aug. 29. He was juſt 38 years of age when he was murdered.

PIGMENTS, preparations uſed by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours. See *COLOUR-Making*, and DYEING.

PIGNEROL is a town of Italy in the province of Piedmont, in E. Long. 7. 15. N. Lat. 44. 45. ſituated on the river Chizon, 10 miles ſouth-weſt of Turin, at the foot of the Alps, and the confines of Dauphiny. The town is ſmall, but populous, and extremely well fortified by the king of Sardinia, ſince the treaty of Utrecht. It is defended by a citadel, on the top of the mountain near which is the caſtle of Perouſe, which was built at the entrance of the valley of that name.

PIGNUT, or *Earthnut*. See BUNIUM, BOTANY *Index*.

PIGUS, in *Ichthyology*, is the name of a ſpecies of leather-mouthed fiſh, very much reſembling the nature of the common carp; being of the ſame ſhape and ſize, and its eyes, fins, and fleſhy palate, exactly the ſame; from the gills to the tail there is a crooked dotted line; the back and ſides are bluiſh, and the belly reddiſh. It is covered with large ſcales; from the middle of each of which there riſes a fine pellucid prickle, which is very ſharp. It is an excellent fiſh for the table, being perhaps preferable to the carp; and it is in ſeaſon in the months of March and April. It is caught in lakes in ſome parts of Italy, and is mentioned by Pliny, though without a name. Artedi ſays it is a ſpecies of cyprinus, and he calls it the *cyprinus*, called *piclo* and *pigus*.

PI-HAHIROTH, (Moſes); underſtood to be a mouth or narrow paſs between two mountains, called *Chiroth*, or *Eiroth*, and lying not far from the bottom of the weſtern coaſt of the Arabian gulf; before which mouth the children of Iſrael encamped, juſt before their entering the Red ſea, (Wells).

PIISSKER, in *Ichthyology*, is a fiſh of the muſtela kind, commonly called the *foſſile muſtela*, or *foſſile fiſh*. This fiſh is generally found as long as an ordinary man's hand is broad, and as thick as the finger; but it ſometimes grows much longer: the back is of gray with a number of ſpots and tranſverſe ſtreaks, partly black and partly blue; the belly is yellow, and ſpotted with red, white, and black; the white are the larger, the others look as if they were made with the point of a needle; and there is on each of the ſides a longitudinal black and white line. There are ſome fleſhy excreſcences at the mouth, which are expanded in ſwimming; and when out of the water, they are contracted. Theſe fiſhes run into caverns of the earth, in the ſides of rivers, in marſhy places, and penetrate a great way, and are often dug up at a diſtance from waters. Often, when the waters of brooks and rivers ſwell beyond their banks, and again cover them, they make their way out of the earth into the water; and when it deſerts them, they are often left in vaſt numbers upon the ground, and become a prey to ſwine. It is thought to be much of the ſame kind with the fiſgum fiſh; and it is indeed poſſible that the pæcilia of Schonefeldt is the ſame.

PIKE. See ESOX, ICHTHYOLOGY *Index*.

The pike never ſwims in ſhoals as moſt other fiſh do, but always lies alone; and is ſo bold and ravenous, that he will ſeize upon almoſt any thing leſs than himſelf. Of the ravenous nature of this fiſh we ſhall give the following inſtances. At Rycott in Oxfordſhire, in the year 1749, in a moat ſurrounding the earl of Abingdon's ſeat, there was a jack or pike of ſuch a monſtrous ſize, that it had deſtroyed young ſwans feathers and all. An old cobb ſwan having hatched five young, one after another was loſt till four were gone. At length an under gardener ſaw the fiſh ſeize the fifth. The old one fought him with their beak, and with the aſſiſtance of the gardener, releaſed it although he had got it under water. In the year 1765 a large pike was caught in the river Ouze, which weighed upwards of 28 pounds, and was ſold for a guinea. On gutting the fiſh, a watch with a black ribbon and two ſteel ſeals were found in its ſtomach, which, by the maker's name, &c. was found to belong to a perſon who had been drowned about ſix weeks before. This fiſh breeds but once in a year, which is in March. It is found in almoſt all freſh waters; but is very different in goodneſs, according to the nature of the places where it lives. The fineſt pike are thoſe which feed in clear rivers; thoſe in ponds and meres are inferior, and the worſt of all are thoſe of the fen ditches. They are very plentiful in theſe laſt places, where the water is foul and coloured, and their food, ſuch as frogs and the like, very plentiful, but very coarſe; ſo that they grow large, but are yellowiſh and high bellied, and differ greatly from thoſe which live in the clearer waters.

The fiſhermen have two principal ways of catching the pike; by the ledger, and by the walking-bait.

The ledger-bait is fixed in one certain place, and may continue while the angler is abſent. This muſt be a live bait, a fiſh or frog: and among fiſh, the dace, roach, and gudgeon, are the beſt; of frogs, the only caution is to chooſe the largeſt and yellowеſt that can be met with. If the bait be a fiſh, the hook is to be ſtuck through the upper lip, and the line muſt be 14 yards at leaſt in length; the other end of this is to be tied to a bough of a tree, or to a ſtick driven into the ground near the pike's haunt, and all the line wound round a forked ſtick, except about half a yard. The bait will by this means keep playing ſo much under water, and the pike will ſoon lay hold of it.

If the bait be a frog, then the arming wire of the hook ſhould be put in at the mouth, and out at the ſide; and with a needle and ſome ſtrong ſilk, the hinder leg of one ſide is to be faſtened by one ſtitch to the wire-arming of the hook. The pike will ſoon ſeize this, and muſt have line enough to give him leave to get to his haunt and poach the bait.

The trolling for pike is a pleaſant method alſo of taking them: in this a dead bait ſerves, and none is ſo proper as a gudgeon.

This is to be pulled about in the water till the pike ſeizes it; and then it is to have line enough, and time to ſwallow it: the hook is ſmall for this ſport, and has a ſmooth piece of lead fixed at its end to ſink the bait; and the line is very long, and runs through a ring at the end of the rod, which muſt not be too ſlender at top.

The art of feeding pike, ſo as to make them very fat, is the giving them eels; and without this it is not to be done under a very long time; otherwiſe perch, while ſmall, and their prickly fins tender, are the beſt food for them. Bream put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike, who will take care that they ſhall not increaſe over much. The numerous ſhoals of roaches and ruds, which are continually changing place, and often in floods get into the pike's quarters, are food for them for a long time.

Pike, when uſed to be fed by hand, will come up to the very ſhore, and take the food that is given them out of the fingers of the feeder. It is wonderful to ſee with what courage they will do this, after a while practiſing; and it is a very diverting ſight when there are ſeveral of them nearly of the ſame ſize, to ſee what ſtriving and fighting there will be for the beſt bits when they are thrown in. The moſt convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, by that means, the offal of the feedings will all lie in one place, and the deep water will ſerve for a place to retire into and reſt in, and will be always clean and in order.

Carp may be fed in the ſame manner as pike; and though by nature a fiſh as remarkably ſhy and timorous as the pike is bold and fearleſs, yet by cuſtom they will come to take their food out of the perſon's hand; and will, like the pike, quarrel among one another for the niceſt bits.

Pike, in *War*, an offenſive weapon, conſiſting of a wooden ſhaft, 12 or 14 feet long, with a flat ſteel head, pointed, called the *ſpear*. This weapon was long in uſe among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is ſubſtituted in its ſtead. It is ſtill uſed by ſome of the officers of infantry, under the name of *ſponton*. The Macedonian phalanx was a battalion of pikemen. See Phalanx.

PILA marina, or the *ſea-ball*, in *Natural Hiſtory*, is the name of a ſubſtance very common on the ſhores of the Mediterranean, and elſewhere. It is generally found in the form of a ball about the ſize of the balls of horſe dung, and compoſed of a variety of fibrillæ irregularly complicated. Various conjectures have been given of its origin by different authors. John Bauhine tells us, that it conſiſts of ſmall hairy fibres and ſtraws, ſuch as are found about the ſea plant called *alga vitriariorum*; but he does not aſcertain what plant it owes its origin to. Imperatus imagined it conſiſted of the exuviæ both of vegetable and animal bodies. Mercatus is doubtful whether it be a congeries of the fibrillæ of plants, wound up into a ball by the motion of the ſea water, or whether it be not the workmanſhip of ſome ſort of beetle living about the ſea ſhore, and analogous to our common dung beetle's ball, which it elaborates from dung for the reception of its progeny. Schreckius ſays it is compoſed of the filaments of ſome plant of the reed kind: and Welchius ſuppoſes it is compoſed of the pappous part of the flowers of the reed. Maurice Hoffman thinks it the excrement of the hippopotamus; and others think it that of the phoca or ſea calf. Klein, who had thoroughly and minutely examined the bodies themſelves, and alſo what authors had conjectured concerning them, thinks that they are wholly owing to, and entirely compoſed of, the capillaments which the leaves, growing to the woody ſtalk of the *alga vitriariorum*, have when they wither and decay. Theſe leaves, in their natural ſtate, are as thick as a wheat ſtraw, and they are placed ſo thick about the tops and extremities of the ſtalks, that they enfold, embrace, and lie over one another; and from the middle of theſe cluſters of leaves, and indeed from the woody ſubſtance of the plant itſelf, there ariſe ſeveral other very long, flat, ſmooth, and brittle leaves. Theſe are uſually four from each tuft of the other leaves; and they have ever a common vagina, which is membranaceous and very thin. This is the ſtyle of the plant, and the *pila marina* appears to be a cluſter of the fibres of the leaves of this plant, which cover the whole ſtalk, divided into their conſtituent fibres; and by the motion of the waves firſt broken and worn into ſhort ſhreds, and afterwards wound up together into a roundiſh or longiſh ball.

Pila, was a ball made in a different manner according to the different games in which it was to be uſed. Playing at ball was very common amongſt the Romans of the firſt diſtinction, and was looked upon as a manly exerciſe, which contributed both to amuſement and health. The pila was of four ſorts: 1ſt, *Follis* or *balloon*; 2d, *Pila Trigonalis*; 3d, *Pila Paganica*; 4th, *Harpaſtum*. All theſe come under the general name of pila. For the manner of playing with each of them, ſee the articles Follis, Trigonalis.

PILASTER, in *Architecture*. See there, N° 50, &c.

PILATE, or Pontius Pilate, was governor of Judea when our Lord was crucified. Of his family or country we know but little, though it is believed that he was of Rome, or at leaſt of Italy. He was ſent to govern Judea in the room of Gratus, in the year 26 or 27 of the vulgar era, and governed this province for ten years, from the 12th or 13th year of Tiberius to the 22d or 23d. He is repreſented both by Philo and Joſephus as a man of an impetuous and obſtinate temper, and as a judge who uſed to ſell juſtice, and to pronounce any ſentence that was deſired, provided he was paid for it. The ſame authors make mention of his rapines, his injuries, his murders, the torments that he inflicted upon the innocent, and the perſons he put to death without any form of proceſs. Philo, in particular, deſcribes him as a man that exerciſed an exceſſive cruelty during the whole time of his government, who diſturbed the repoſe of Judea, and gave occaſion to the troubles and revolt that followed after. St Luke (xiii. 1, 2, &c.) acquaints us, that Pilate had mingled the blood of the Galileans with their ſacrifices; and that the matter having been related to Jeſus Chriſt, he ſaid, "Think you that theſe Galileans were greater ſinners than other Galileans, becauſe they ſuffered this calamity. I tell you nay; and if you do not repent, you ſhall all periſh in like manner." It is unknown upon what occaſion Pilate cauſed theſe Galileans to be ſlain in the temple while they were ſacrificing; for this is the meaning of that expreſſion of mingling their blood with their ſacrifices. Some think they were diſciples of Judas the Gaulonite, who taught that the Jews ought not to pay tribute to foreign princes; and that Pilate had put ſome of them to death even in the temple; but there is no proof of this fact. Others think that theſe Galileans were Samaritans, whom Pilate cut to pieces in the village of Tirataba †, as they were preparing to go up to Mount Gerizim, where a certain impoſtor had promiſed to diſcover treaſures to them; but this event did not happen before the year 35 of the common era, and conſequently two years after the death of Jeſus Chriſt. At the time of our Saviour's paſſion, Pilate made ſome endeavours to deliver him out of the hands of the Jews. He knew they had delivered him up, and purſued his life with ſo much violence, only out of malice and envy (Matt. xxvii. 18.). His wife alſo, who had been diſturbed the night before with frightful dreams, ſent to tell him ſhe deſired him not to meddle in the affair of that juſt perſon (ib. 19.). He attempted to appeaſe the wrath of the Jews, and to give them ſome ſatisfaction, by whipping Jeſus Chriſt (John xix. 1. Matth. xxvii. 26.). He tried to take him out of their hands, by propoſing to deliver him or Barabbas, on the day of the feſtival of the paſſover. Laſtly, he had a mind to diſcharge himſelf from pronouncing judgement againſt him, by ſending him to Herod king of Galilee (Luke xxiii. 7, 8.). When he ſaw all this would not ſatisfy the Jews, and that they even threatened him in ſome manner, ſaying he could be no friend to the emperor if he let him go (John xix. 12, 15.), he cauſed

† *Joſeph. Antiq.* lib. xviii. c. 5.

water to be brought, waſhed his hands before all the people, and publicly declared himſelf innocent of the blood of that juſt perſon (Matt. xxvii. 23, 24.); yet at the ſame time he delivered him up to his ſoldiers, that they might crucify him. This was enough to juſtify Jeſus Chriſt, as Calmet obſerves, and to ſhow that he held him as innocent; but it was not enough to vindicate the conſcience and integrity of a judge, whoſe duty it was as well to aſſert the cauſe of oppreſſed innocence as to puniſh the guilty and criminal. He ordered to be put over our Saviour's croſs, as it were, an abſtract of his ſentence, and the motive of his condemnation (John xix. 9.), *Jeſus of Nazareth, king of the Jews*, which was written in Latin, Greek, and Hebrew. Some of the Jews found fault with it, and remonſtrated to Pilate that he ought to have written *Jeſus of Nazareth, who pretended to be king of the Jews*. But Pilate could not be prevailed with to alter it, and gave them this peremptory anſwer, *That what he had written he had written.*

Towards evening, he was applied to for leave to take down the bodies from the croſs, that they might not continue there the following day, which was the paſſover and the ſabbath-day (John xix. 31.). This he allowed, and granted the body of Jeſus to Joſeph of Arimathea, that he might pay his laſt duties to it, (ib. 33.). Laſtly, when the prieſts, who had ſolicited the death of our Saviour, came to deſire him to ſet a watch about the ſepulchre, for fear his diſciples ſhould ſteal him away by night, he anſwered them, that they had a guard, and might place them there themſelves (Matt. xxvii. 65.). This is the ſubſtance of what the goſpel tells us concerning Pilate.

Juſtin Martyr, Tertullian, Euſebius, and after them ſeveral others both ancient and modern, aſſure us, that it was formerly the cuſtom for Roman magiſtrates to prepare copies of all verbal proceſſes and judicial acts which they paſſed in their ſeveral provinces, and to ſend them to the emperor. And Pilate, in compliance to this cuſtom, having ſent word to Tiberius of what had paſſed relating to Jeſus Chriſt, the emperor wrote an account of it to the ſenate, in a manner that gave reaſon to judge that he thought favourably of the religion of Jeſus Chriſt, and ſhowed that he ſhould be willing they would decree divine honours to him. But the ſenate was not of the ſame opinion, and ſo the matter was dropped. It appears by what Juſtin ſays of theſe acts, that the miracles of Jeſus Chriſt were mentioned there, and even that the ſoldiers had divided his garments among them. Euſebius inſinuates that they ſpoke of his reſurrection and aſcenſion. Tertullian and Juſtin refer to theſe acts with ſo much confidence as would make one believe they had them in their hands. However, neither Euſebius nor St Jerome, who were both inquiſitive, underſtanding perſons, nor any other author that wrote afterwards, ſeem to have ſeen them, at leaſt not the true and original acts; for as to what we have now in great number, they are not authentic, being neither ancient nor uniform. There are alſo ſome pretended letters of Pilate to Tiberius, giving a hiſtory of our Saviour, but they are univerſally allowed to be ſpurious.

Pilate being a man that, by his exceſſive cruelties and rapine, had diſturbed the peace of Judea during the whole time of his government, was at length depoſed by Vitellius the proconſul of Syria, in the 36th year of Jeſus Chriſt, and ſent to Rome to give an account of his conduct to the emperor. But though Tiberius died before Pilate arrived at Rome, yet his ſucceſſor Caligula baniſhed him to Vienne in Gaul, where he was reduced to ſuch extremity that he killed himſelf with his own hand. The evangeliſts call him governor, though in reality he was no more than procurator of Judea, not only becauſe governor was a name of general uſe, but becauſe Pilate in effect acted as one, by taking upon him to judge in criminal matters; as his predeceſſors had done, and other procurators in the ſmall provinces of the empire where there was no proconſul, conſtantly did. See *Calmet's Dictionary*, *Echard's Eccleſiaſtical Dictionary*, and *Beauſobre's Annot.*

With regard to Pilate's wife, the general tradition is, that ſhe was named Claudia Procula or Procla; and in relation to her dream, ſome are of opinion that as ſhe had intelligence of our Lord's apprehenſion, and knew by his character that he was a righteous perſon, her imagination, being ſtruck with theſe ideas, did naturally produce the dream we read of; but others think that this dream was ſent providentially upon her, for the clearer manifeſtation of our Lord's innocence.

PILATRE DE ROZIER, *Francis*, was born at Metz the 30th of March 1756. He was firſt apprentice to an apothecary there, and afterwards went to Paris in queſt of farther improvement. He applied himſelf to the ſtudy of natural hiſtory and of natural philoſophy, and had already acquired ſome reputation, when the diſcovery of M. de Montgolfier had juſt aſtoniſhed the learned world. On the 25th of October 1783, he attempted an aerial voyage with the Marquis of Arlande. He performed ſeveral other excurſions in this way with brilliant ſucceſs, in the preſence of the royal family of France, of the king of Sweden, and of Prince Henry of Pruſſia. He then reſolved to paſs into England by means of his aerial vehicle, and for that purpoſe he repaired to Boulógne, whence he roſe about 7 o'clock in the morning of the 15th June 1785; but in half an hour after he ſet out, the balloon took fire, and the aeronaut, with his companion M. Romaine, were cruſhed to death by the fall of that machine, which was more ingenious, perhaps, than uſeful *. Pilatre's ſocial virtues and courage, which were very diſtinguiſhed, heightened the regret of his friends for his loſs. His merit as a chemiſt, and his experiments as an aeronaut, procured him ſome pecuniary reward, and ſome public appointments. He had a penſion from the king, was intendant of Monſieur's cabinets of natural philoſophy, chemiſtry, and natural hiſtory, profeſſor of natural philoſophy, a member of ſeveral academies, and principal director of Monſieur's muſeum.

PILCHARD, in ichthyology, a fiſh which has a general reſemblance to the herring, but differs in ſome eſſential particulars. The body of the pilchard is leſs compreſſed than that of the herring, being thicker and rounder: the noſe is ſhorter in proportion, and turns up; the under jaw is ſhorter. The back is more elevated; the belly leſs ſharp. The dorſal fin of the pilchard is placed exactly in the centre of gravity, ſo that when taken up by it, the body preſerves an equilibrium, whereas that of the herring dips at the head. The ſcales of the pilchard adhere very cloſely, whereas thoſe of the herring very eaſily drop off. The pilchard is in general leſs than the herring; but it is fatter, or more full of oil. [illegible]

* See *Aeroſtation*, N° 34.

The pilchard appears in vaſt ſhoals off the Corniſh coaſts about the middle of July, diſappearing the beginning of winter, yet ſometimes a few return again after Chriſtmas. Their winter retreat is the ſame with that of the herring, and their motives for migrating the ſame †. They affect, during ſummer, a warmer latitude; for they are not found in any quantities on any of our coaſts except thoſe of Cornwall, that is to ſay, from Fowey harbour to the Scilly iſles, between which places the ſhoals keep ſhifting for ſome weeks. The approach of the pilchard is known by much the ſame ſigns as thoſe that indicate the arrival of the herring. Perſons, called in Cornwall *huers*, are placed on the cliffs, to point to the boats ſtationed off the land the courſe of the fiſh. By the 1ſt of James I. c. 23. fiſhermen are empowered to go on the grounds of others to hue, without being liable to actions of treſpaſs, which before occaſioned frequent law-ſuits.

† See *Clupea.*

The emoluments that accrue to the inhabitants of that country are great, and are beſt expreſſed in the words of Dr W. Borlaſe, in his *Account of the Pilchard Fiſhery*. "It employs a great number of men on the ſea, training them thereby to naval affairs; employs men, women, and children, at land, in ſalting, preſſing, waſhing, and cleaning, in making boats, nets, ropes, caſks, and all the trades depending on their conſtruction and ſale. The poor is fed with the offals of the captures; the land with the refuſe of the fiſh and ſalt; the merchant finds the gains of commiſſion and honeſt commerce; the fiſherman, the gains of the fiſh. Ships are often freighted hither with ſalt, and into foreign countries with the fiſh, carrying off at the ſame time part of our tin. The uſual number of hogſheads of fiſh exported each year, for 10 years, from 1747 to 1756 incluſive, from the four ports of Fowey, Falmouth, Penzance, and St Ives, in all amounts to 29,794; ſince it appears that Fowey has exported yearly 1732 hogſheads; Falmouth, 14,631 hogſheads and two-thirds; Penzance and Mounts-Bay, 12,149 hogſheads and one-third; St Ives, 1282 hogſheads. Every hogſhead for ten years laſt paſt, together with the bounty allowed for each when exported, and the oil made out of each, has amounted, one year with another at an average, to the price of 1l. 13s. 3d.; ſo that the caſh paid for pilchards exported has, at a medium, annually amounted to the ſum of 49,532l. 10s." The numbers that are taken at one ſhooting out of the nets is amazingly great. Mr Pennant ſays, that Dr Borlaſe aſſured him, that on the 5th of October 1767, there were at one time incloſed in St Ives's bay 7000 hogſheads, each hogſhead containing 35,000 fiſh, in all 245,000,000.

PILE, in *Heraldry*, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the ſhield.

PILE, among the Greeks and Romans, was a pyramid built of wood, whereon were laid the bodies of the deceaſed to be burnt. It was partly in the form of an altar, and differed in height according to the quality of the perſon to be conſumed. Probably it might originally be conſidered as an altar, on which the dead were conſumed as a burnt-offering to the infernal deities. The trees made uſe of in the erection of a funeral pile were ſuch as abounded in pitch or roſin, as being moſt combuſtible; if they uſed any other wood, it was ſplit that it might the more eaſily catch fire. Round the pile were placed cypreſs boughs to hinder the noiſome ſmell. See FUNERAL.

PILE, in *Building*, is uſed for a large ſtake rammed into the ground in the bottom of rivers, or in marſhy land, for a foundation to build upon.

PILE is alſo uſed among architects for a maſs of building.

PILE, in *Coinage*, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inſcription to be ſtruck on the coin. See COINAGE.

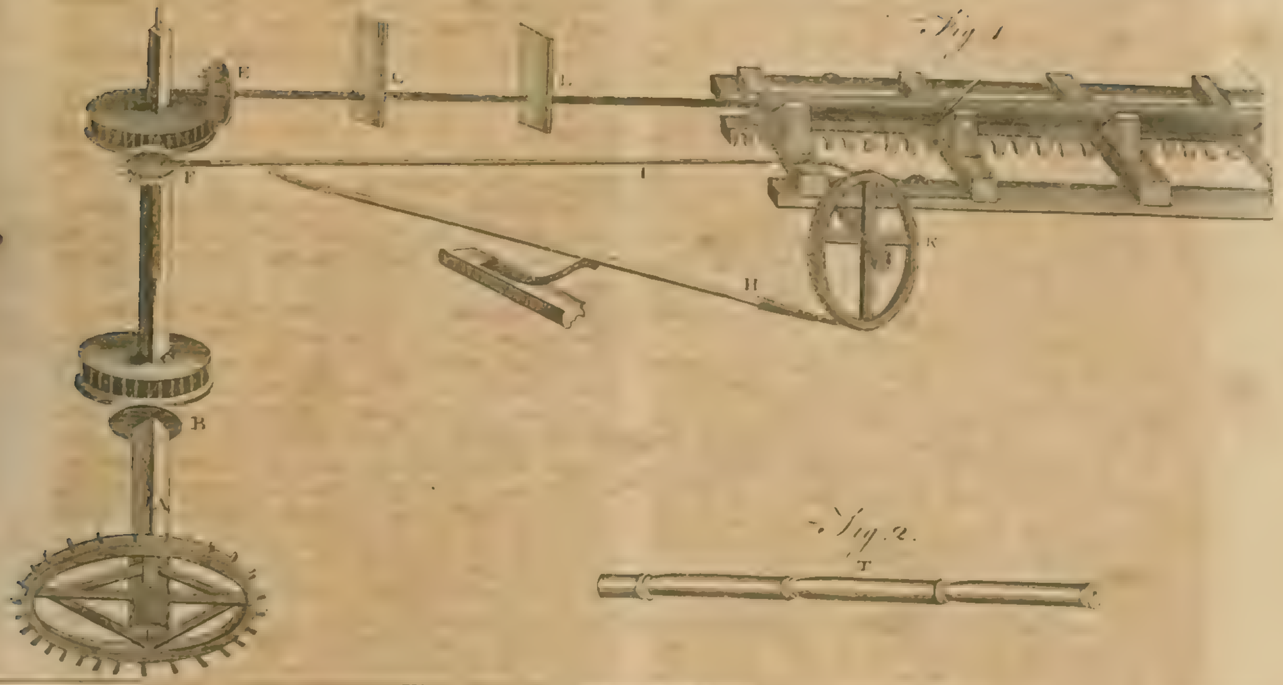
Accordingly we ſtill call the arms ſide of a piece of money the *pile*, and the head the *croſs*; becauſe in ancient coin, a croſs uſually took the place of the head in ours.

PILE-Engine, a very curious machine invented by Mr Vauloue for driving the piles of Weſtminſter-bridge. A is a great upright ſhaft or axle, on which are the great wheel B, and the drum C, turned by horſes joined to the bars S, S. The wheel B turns the trundle X, on the top of whoſe axis is the fly O, which ſerves to regulate the motion, and alſo to act againſt the horſes, and to keep them from falling when the heavy ram Q is diſcharged to drive the pile P down into the mud in the bottom of the river. The drum C is looſe upon the ſhaft A, but is locked to the wheel B by the bolt Y. On this drum the great rope HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F, that takes hold of the ram Q by the ſtaple R, for drawing it up. D is a ſpiral or fuſy fixed to the drum, on which is wound the ſmall rope T that goes over the pulley U, under the pulley V, and is faſtened to the top of the frame at 7. To the pulley-block V is hung the counterpoiſe W, which hinders the follower T from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its deſcent, the line T winds downwards upon the fuſy, on a larger and larger radius, by which means the counterpoiſe W acts ſtronger and ſtronger againſt it; and ſo allows it to come down with only a moderate and uniform velocity. The bolt Y locks the drum to the great wheel, being puſhed upward by the ſmall lever 2, which goes through a mortiſe in the ſhaft A, turns upon a pin in the bar 3, fixed to the great wheel B, and has a weight 4, which always tends to puſh up the bolt Y through the wheel into the drum. L is the great lever turning on the axis *m*, and reſting upon the forcing bar 5, 5, which goes through a hollow in the ſhaft A, and bears up the little lever 2.

Plate CCCCXIX.

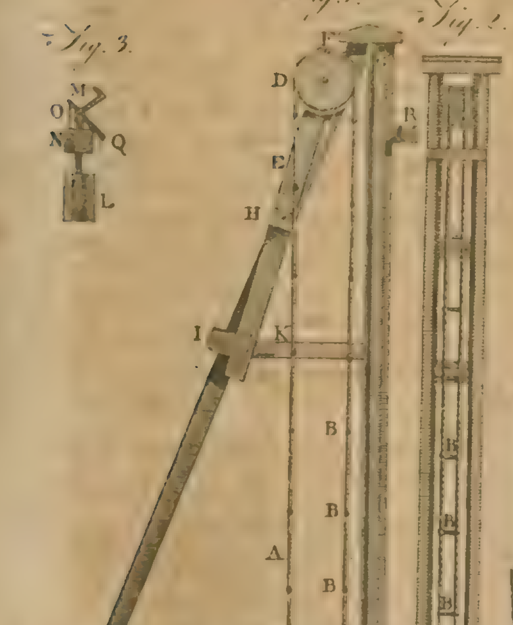
By the horſes going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs come between the inclined planes E; which, by ſhutting the tongs at the top, opens it at the foot, and diſcharges the ram which falls down between the guides *b b* upon the pile P, and drives it by a few ſtrokes as far into the mud as it will go; after which, the top part is ſawed off cloſe to the mud by an engine for that purpoſe. Immediately after the ram is diſcharged, the piece 6 upon the follower G takes hold of the ropes *a a*, which raiſe the end of the lever L, and cauſe its end N to deſcend and preſs down the forcing bar 5 upon the little lever

Machine for boring wooden PIPES. Plate CCCCXIX.

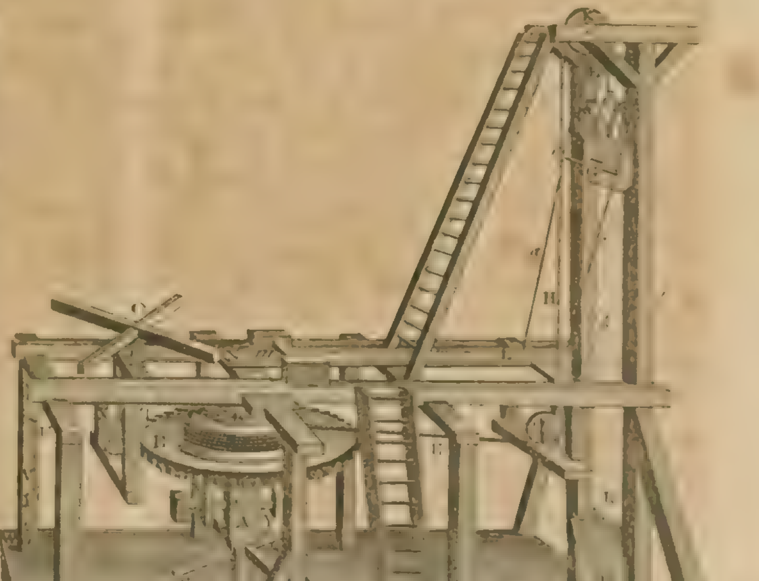


PILE Engine.

Bance's PILE Engine



Vauloue's PILE Engine



Pile.

lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs ſlip over the ſtaple R, and the weight of their heads cauſes them to fall outward, and ſhut upon it. Then the weight 4 puſhes up the bolt Y into the drum, which locks it to the great wheel, and ſo the ram is drawn up as before.

As the follower comes down, it cauſes the drum to turn backward, and unwinds the rope from it, whilſt the horſes, great wheel, trundle, and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoiſe W is drawn up, and its rope T wound upon the ſpiral fuſy D.

There are ſeveral holes in the under ſide of the drum, and the bolt Y always takes the firſt one that it finds when the drum ſtops by the falling of the follower upon the ram; until which ſtoppage the bolt has not time to ſlip into any of the holes.

This engine was placed upon a barge on the water, and ſo was eaſily conveyed to any place deſired. The ram was a ton weight; and the guides *b b*, by which it was let fall, were 30 feet high.

A new machine for driving piles has been invented by Mr Bunce of Kirby ſtreet, Hatton ſtreet, London. It will drive a greater number of piles in a given time than any other; and can be conſtructed more ſimply to work by horſes than Mr Vauloue's engine above deſcribed.

Plate CCCCXIX.

Fig. 1 and 2 repreſent a ſide and front ſection of the machine. The chief parts are A, fig. 1, which are two endleſs ropes, or chains, connected by croſs pieces of iron B (ſee fig. 2), correſponding with two croſs grooves cut diametrically oppoſite in the wheel C (fig. 1.), into which they are received; and by which means the rope or chain A is carried round. FHK is a ſide-view of a ſtrong wooden frame moveable on the axis H. D is a wheel, over which the chain paſſes and turns within at the top of the frame. It moves occaſionally from F to G upon the centre H, and is kept in the poſition F by the weight I fixed to the end K. Fig. 3. L is the iron ram, which is connected with the croſs pieces by the hook M. N is a cylindrical piece of wood ſuſpended at the hook at O, which by ſliding freely upon the bar that connects the hook to the ram, always brings the hook upright upon the chain when at the bottom of the machine, in the poſition of GP. See fig. 1.

When the man at S turns the uſual crane work, the ram being connected to the chain, and paſſing between the guides, is drawn up in a perpendicular direction; and when it is near the top of the machine, the projecting bar Q of the hook ſtrikes againſt a croſs piece of wood at R (fig. 1.); and conſequently diſcharges the ram, whilſt the weight I of the moveable frame inſtantly draws the upper wheel into the poſition ſhown at F, and keeps the chain free of the ram in its deſcent. The hook, while deſcending, is prevented from catching the chain by the wooden piece N. For that piece being ſpecifically lighter than the iron weight below, and moving with a leſs degree of velocity, cannot come in contact with the iron till it is at the bottom and the ram ſtops. It then falls and again connects the hook with the chain, which draws up the ram, as before.

Mr Bunce has made a model of this machine, which performs perfectly well; and he obſerves, that, as the motion of the wheel C is uninterrupted, there appears to be the leaſt poſſible time loſt in the operation.

PILE-Worms, are a kind of worms found in the piles of the ſea-dikes in Holland. They are of very various ſizes; for ſome of the young ones are not above an inch or two in length, while others have been found thirteen or fourteen inches long. The heads of theſe creatures are covered with two hard ſhells or hemicrania; which together form a figure reſembling an augre; and with which they bore the wood. The beſt remedy againſt them is, to perforate the pile with many ſmall holes about an inch aſunder; then it muſt be done over with a varniſh in the hotteſt ſun; and, while the varniſh is hot, brick duſt muſt be ſtrewed over it: and this being ſeveral times repeated, the pile will be covered with a ſtrong cruſt abſolutely impenetrable to all inſects.

PILES, in *Medicine*, the ſame with hæmorrhoids. See MEDICINE, Nº 240, &c.

PILEUS, in Roman antiquity, was the ordinary cap or hat worn at public ſhows and ſacrifices, and by the freedmen. It was one of the common rewards aſſigned to ſuch gladiators as were ſlaves, in token of their obtaining freedom.

PILEWORT (*Ranunculus ficaria*, Lin.), the root. This is a very ſmall plant, found in moiſt meadows and by hedge ſides. The roots conſiſt of ſlender fibres with ſome little tubercles among them, which are ſuppoſed to reſemble the hæmorrhoids. From thence it has been concluded, that this root muſt needs be of wonderful efficacy for the cure of that diſtemper: to the taſte, it is little other than mucilaginous; and although ſtill retained in ſeveral of the foreign pharmacopœias, it is hardly in uſe in this country.

Pilgrimage.

PILGRIM, one who travels through foreign countries to viſit holy places, and to pay his devotion to the relicks of dead ſaints. See PILGRIMAGE.

The word is formed from the Flemiſh *pelgrim*, or Italian *pelegrino*, which ſignifies the ſame; and thoſe originally from the Latin *peregrinus*, a "ſtranger or traveller."

PILGRIMAGE, a kind of religious diſcipline, which conſiſts in taking a journey to ſome holy place in order to adore the relicks of ſome deceaſed ſaint. Pilgrimages began to be made about the middle ages of the church; but they were moſt in vogue after the end of the 11th century, when every one was for viſiting places of devotion, not excepting kings and princes themſelves; and even biſhops made no difficulty of being abſent from their churches on the ſame account. The places moſt viſited were Jeruſalem, Rome, Compoſtella (A), and [illegible]; but the greateſt numbers now

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(A) It deſerves to be remarked here, that in the year [illegible], under the reign of Henry VI. abundance of licences were granted from the crown of England to captains of Engliſh ſhips, for carrying numbers of devout perſons to the ſhrine of St James of Compoſtella in Spain; provided [illegible] reſort to Loretto, in order to viſit the chamber of the bleſſed virgin, in which ſhe was born, and brought up her ſon Jeſus till he was 12 years of age. For the pilgrimage of the followers of Mahomet, ſee Mahometanism.

In every country where popery was eſtabliſhed, pilgrimages were common: and in thoſe countries which are ſtill popiſh, they continue. In England, the ſhrine of St Thomas à Becket was the chief reſort of the pious: and in Scotland, St Andrews; where, as tradition informs us, was depoſited a leg of the holy apoſtle. In Ireland they ſtill continue; for, from the beginning of May till the middle of Auguſt every year, crowds of popiſh penitents from all parts of that country reſort to an iſland near the centre of *Lough Ern*, or *White Lake*, in the county of Donegal, to the amount of 3000 or 4000. Theſe are moſtly of the poorer ſort, and many of them are proxies for thoſe who are richer; ſome of which, however, together with ſome of the prieſts and biſhops on occaſion, make their appearance there. When the pilgrim comes within ſight of the holy lake, he muſt uncover his hands and feet, and thus walk to the water-ſide, and is taken to the iſland for ſixpence. Here there are two chapels and 15 other houſes; to which are added confeſſionals, ſo contrived, that the prieſt cannot ſee the perſon confeſſing. The penance varies according to the circumſtances of the penitent; during the continuance of which (which is ſometimes three, ſix, or nine days) he ſubſiſts on oatmeal, ſometimes made into bread. He traverſes ſharp ſtones on his bare knees or feet, and goes through a variety of other forms, paying ſixpence at every different confeſſion. When all is over, the prieſt bores a gimblet-hole through the pilgrim's ſtaff near the top, in which he faſtens a croſs peg; gives him as many holy pebbles out of the lake as he cares to carry away, for amulets to be preſented to his friends, and ſo diſmiſſes him, an object of veneration to all other papiſts not thus initiated, who no ſooner ſee the pilgrim's croſs in his hands, than they kneel down to get his bleſſing.

There are, however, other parts of Ireland ſacred to extraordinary worſhip and pilgrimage; and the number of holy wells, and miraculous cures, &c. produced by them, is very great. That ſuch things ſhould exiſt in this enlightened age, and in a Proteſtant country, is indeed ſtrange; but our wonder ceaſes, when we reflect that it is among the loweſt, and perhaps the worſt of the people. They who carry external religion to an extreme, and place that confidence in ceremony which belongs only to the ſpirit of it, are ſeldom diſtinguiſhed either for their wiſdom or their virtue. We do not deny, however, that they who carry matters to the other extreme, may be equally deſtitute of real knowledge and genuine morality.

Dr Johnſon, in his *Raſſelas*, gives us ſome obſervations on pilgrimage, which are ſo much to the purpoſe, that we think we cannot do better than lay them before our readers. "Pilgrimage (ſaid Imlac, into whoſe mouth the obſervations are put), like many other acts of piety, may be reaſonable or ſuperſtitious according to the principles upon which it is performed. Long journeys in ſearch of truth are not commanded. Truth, ſuch as is neceſſary to the regulation of life, is always found where it is honeſtly ſought: change of place is no natural cauſe of the increaſe of piety, for it inevitably produces diſſipation of mind. Yet ſince men go every day to view the fields where great actions have been performed, and return with ſtronger impreſſions of the event, curioſity of the ſame kind may naturally diſpoſe us to view that country whence our religion had its beginning: and I believe no man ſurveys thoſe awful ſcenes without ſome confirmation of holy reſolutions. That the Supreme Being may be more eaſily propitiated in one place than in another, is the dream of idle ſuperſtition; but that ſome places may operate upon our own minds in an uncommon manner, is an opinion which hourly experience will juſtify. He who ſuppoſes that his vices may be more ſucceſsfully combated in Paleſtine, will, perhaps, find himſelf miſtaken; yet he may go thither without folly: he who thinks they will be more freely pardoned, diſhonours at once his reaſon and religion."

PILKINGTON, Lætitia, a famous poetical genius, the daughter of Dr Van Lewin, a phyſician of Dublin, where ſhe was born in 1712. She was married very young to the Rev. Matthew Pilkington, a poet alſo of no inconſiderable merit; and the two wits, as is often the caſe, lived very unhappily together. They were at length totally ſeparated, on the huſband accidentally diſcovering a gentleman in her bedchamber at two o'clock in the morning; a circumſtance which ſhe accounted for in a very unſatisfactory manner. The ſtory is told at large in her Memoirs; where ſhe ſays, "Lovers of learning, I am ſure, will pardon me, as I ſolemnly declare it was the attractive charms of a new book, which the gentleman would not lend me, but conſented to ſtay till I read it through, that was the ſole motive of my detaining him." As there are not wanting ſome who form objections to marrying learned wives, the chance of ſuch literary aſſignations may perhaps be added to the liſt of them. After this unlucky adventure, Mrs Pilkington came to London; and having recourſe to her pen for ſubſiſtence, through the means of Colley Cibber, ſhe lived for ſome time on the contributions of the great. She was however thrown into the Marſhalſea for debt; and being ſet at liberty, opened a pamphlet ſhop. She raiſed at length a handſome ſubſcription for her Memoirs; which are written with great ſprightlineſs and wit, containing ſeveral entertaining anecdotes of Dean Swift, with whom ſhe was intimate, as well as many pretty little pieces of her own poetry. This ingenious woman is ſaid at laſt to have killed herſelf with drinking. She died at Dublin, in 1750.

PILL, in *pharmacy*, a form of medicine reſembling a little ball, to be ſwallowed whole; invented for ſuch as

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not to take any thing prejudicial to England, not to reveal any of its ſecrets, nor to carry out with them any more gold or ſilver than what would be ſufficient for their reaſonable expences. In this year there went out thither from England, on the ſaid pilgrimage, the following number of perſons. From London 280, Briſtol 200, Weymouth 122, Dartmouth 90, Yarmouth 60, Jerſey 60, Plymouth 40, Exeter 30, Poole 24, Ipſwich 20, in all 926 perſons.

as cannot take bitter and ill taſted medicinal draughts: as alſo to keep in readineſs for occaſional uſe without decaying. See Materia Medica *Index*.

PILLAR, in architecture. See Architecture.

Pillar, in the manege, is the centre of the ring, or manege ground, round which a horſe turns, whether there be a pillar in it or not. Beſides this, there are pillars on the circumference or ſides of the manege-ground, placed at certain diſtances, by two and two, from whence they are called the *two pillars*, to diſtinguiſh them from that of the centre. The uſe of the pillar in the centre is for regulating the extent of ground, that the manege upon the volts may be performed with method and juſtneſs, and that they may work in a ſquare, by rule and meaſure, upon the four lines of the volts; and alſo to break unruly high-mettled horſes, without endangering the rider. The two pillars are placed at the diſtance of two or three paces one from the other; and the horſe is put between thoſe, to teach him to riſe before and yerk out behind, and put himſelf upon raiſed airs, &c. either by the aids or chaſtiſements.

Pompey's Pillar. See Alexandria.

PILLARS, in antiquarian topography, are large ſingle ſtones ſet up perpendicularly. Thoſe of them which are found in this country have been the work of the Druids; but as they are the moſt ſimple of all monuments, they are unqueſtionably more ancient than druidiſm itſelf. They were placed as memorials recording different events; ſuch as remarkable inſtances of God's mercies, contracts, ſingular victories, boundaries, and ſometimes ſepulchres. Various inſtances of theſe monuments erected by the patriarchs occur in the Old Teſtament: ſuch was that raiſed by Jacob at Luz, afterwards by him named *Bethel*; ſuch alſo was the pillar placed by him over the grave of Rachel. They were likewiſe marks of execrations and magical taliſmans.

Theſe ſtones, from having long been conſidered as objects of veneration, at length were by the ignorant and ſuperſtitions idolatrouſly worſhipped; wherefore, after the introduction of Chriſtianity, ſome had croſſes cut on them, which was conſidered as ſnatching them from the ſervice of the devil. Vulgar ſuperſtition of a later date has led the common people to conſider them as perſons transformed into ſtone for the puniſhment of ſome crime, generally that of ſabbath-breaking; but this tale is not confined to ſingle ſtones, but is told alſo of whole circles: witneſs the monuments called the *hurlers* in Cornwall, and *Rollorick ſtones* in Warwickſhire. The firſt are by the vulgar ſuppoſed to have been once men, and thus transformed as a puniſhment for playing on the Lord's day at a game called *hurling*; the latter, a pagan king and his army.

At Wilton, where the earl of Pembroke has a very magnificent houſe, there is a pillar of one piece of white Egyptian granite, which was brought from the temple of Venus Genetrix at Rome, near 14 feet high and 22 inches diameter, with an inſcription to Aſtarte or Venus.

PILLORY (*colliſtrigium*, "collum ſtringens," *pilloria*, from the French *pilleur*, i. e. *depeculator*; or *pilori*, derived from the Greek πυλη, *janua*, a "door," becauſe one ſtanding on the pillory puts his head as it were through a door, and ὁραω, *video*), is an engine made of wood to puniſh offenders, by expoſing them to public view, and rendering them infamous. There is a *ſtatute of the pillory*, 51 Hen. III. And by ſtatute it is appointed for bakers, foreſtallers, and thoſe who uſe falſe weights, perjury, forgery, &c. 3 *Inſt.* 219. Lords of leets are to have a pillory and tumbrel, or it will be the cauſe of forfeiture of the leet; and a village may be bound by preſcription to provide a pillory, &c. 2 *Hawk.* P. C. 73.

PILOT, the officer who ſuperintends the navigation, either upon the ſea-coaſt or on the main ocean. It is, however, more particularly applied by our mariners to the perſon charged with the direction of a ſhip's courſe on or near the ſea-coaſt, and into the roads, bays, rivers, havens, &c. within his reſpective diſtrict.

Pilots of ſhips, taking upon them to conduct any ſhip from Dover, &c. to any place up the river Thames, are to be firſt examined and approved by the maſter and wardens of the ſociety of Trinity Houſe, &c. or ſhall forfeit 10l. for the firſt offence, 20l. for the ſecond, and 40l. for every other offence; one moiety to the informer, the other to the maſter and wardens; but any maſter or mate of a ſhip may pilot his own veſſel up the river: and if any ſhip be loſt through the negligence of any pilot, he ſhall be for ever after diſabled to act as a pilot. 3 Geo. I. c. 13. Alſo the lord-warden of the cinque ports may make rules for the government of pilots, and order a ſufficient number to ply at ſea to conduct ſhips up to the Thames: 7 Geo. I. c. 21. No perſon ſhall act as a pilot on the Thames, &c. (except in collier ſhips) without a licence from the maſter and wardens of Trinity Houſe at Deptford, on pain of forfeiting 20l. And pilots are to be ſubject to the government of that corporation; and pay ancient dues, not exceeding 1s. in the pound, out of wages, for the uſe of the poor thereof. Stat. 5 Geo. II. c. 20.

By the former laws of France, no perſon could be received as pilot till he had made ſeveral voyages and paſſed a ſtrict examination; and after that, on his return in long voyages, he was obliged to lodge a copy of his journal in the admiralty; and if a pilot occaſioned the loſs of a ſhip, he had to pay 100 livres fine, and to be for ever deprived of the exerciſe of pilotage; and if he did it deſignedly, be puniſhed with death. *Lex Mercat.* 70, 71.

The laws of Oleron ordain, That if any pilot deſignedly miſguide a ſhip, that it may be caſt away, he ſhall be put to a rigorous death, and hung in chains: and if the lord of a place, where a ſhip be thus loſt, abet ſuch villains in order to have a ſhare of the wreck, he ſhall be apprehended, and all his goods forfeited for the ſatisfaction of the perſons ſuffering; and his perſon ſhall be faſtened to a ſtake in the midſt of his own manſion, which, being fired on the four corners, ſhall be burned to the ground, and he with it. *Leg. Ol.* c. 25. And if the fault of a pilot be ſo notorious, that the ſhip's crew ſee an apparent wreck, they may lead him to the hatches, and ſtrike off his head; but the common law denies this haſty execution: an ignorant pilot is ſentenced to paſs thrice under the ſhip's keel by the laws of Denmark. *Lex Mercat.* 72.

The regulations with regard to pilots in the royal navy are as follow. "The commanders of the king's ſhips, in order to give all reaſonable encouragement to ſo uſeful a body of men as pilots, and to remove all their objections to his majeſty's ſervice, are ſtrictly charged to treat them with good uſage, and an equal reſpect with warrant-officers.

"The purſer of the ſhip is always to have a ſet of bedding provided on board for the pilots; and the captain is to order the boatſwain to ſupply them with hammocks, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ſhip.

"A pilot, when conducting one of his majeſty's ſhips in pilot-water, ſhall have the ſole charge and command of the ſhip, and may give orders for ſteering, ſetting, trimming, or furling the ſails; tacking the ſhip; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to obſerve the conduct of the pilot; and if he judges him to behave ſo ill as to bring the ſhip into danger, he may remove him from the command and charge of the ſhip, and take ſuch methods for her preſervation as ſhall be judged neceſſary; remarking upon the log book, the exact hour and time when the pilot was removed from his office, and the reaſons aſſigned for it.

"Captains of the king's ſhips, employing pilots in foreign parts of his majeſty's dominions, ſhall, after performance of the ſervice, give a certificate thereof to the pilot, which being produced to the proper naval officer, he ſhall cauſe the ſame to be immediately paid; but if there be no naval-officer there, the captain of his majeſty's ſhip ſhall pay him, and ſend the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

"Captains of his majeſty's ſhips, employing foreign pilots to carry the ſhips they command into or out of foreign ports, ſhall pay them the rates due by the eſtabliſhment or cuſtom of the country, before they diſcharge them: whoſe receipts being duly vouched, and ſent, with a certificate of the ſervice performed, to the navy-board, they ſhall cauſe them to be paid with the ſame exactneſs as they do bills of exchange." *Regulations and Inſtructions of the Sea ſervice*, &c.

PILOT-Fiſh. See GASTEROSTEUS, ICHTHYOLOGY *Index.*

Oſbec tells us, that they are ſhaped like thoſe mackerels which have a tranſverſe line upon the body. "Sailors (continues he) give them the name of *pilots*, becauſe they cloſely follow the dog-fiſh, ſwimming in great ſhoals round it on all ſides. It is thought that they point out ſome prey to the dog-fiſh. They are not only not touched, but alſo preſerved by it againſt all their enemies.

It likewiſe follows the ſhark, apparently for the purpoſe of devouring the remains of its prey. It is pretended that it acts as its pilot. The manner in which it attends the ſhark, according to M. Daubenton, may have given riſe to this name. It is ſaid to ſwim at the height of a foot and a half from the ſnout of this voracious animal, to follow and imitate all its movements, and to ſeize with addreſs every part of its prey which the ſhark allows to eſcape, and which is light enough to buoy up towards the ſurface of the water. When the ſhark, which has its mouth below, turns to ſeize any fiſh, the pilot-fiſh ſtarts away; but as ſoon as the ſhark reſumes his ordinary poſition, it returns to its former place. It is ſaid, that in the gulf of Guinea theſe fiſhes follow ſhips for the ſake of the offals and human excrements; and hence the Dutch give them the name of *dung fiſh*. It is remarkable, that though ſo ſmall they can keep pace with ſhips in their ſwifteſt courſe.

PILTEN, a diviſion of Courland, which lies in Courland properly ſo called, derives its name from the ancient caſtle or palace of Pilten, built by Valdemar II. king of Denmark about the year 1220, when he founded a biſhop's ſee in this country for the more effectual converſion of its Pagan inhabitants. This diſtrict afterwards ſucceſſively belonged to the Germans, then again to the king of Denmark, the duke of Courland, and to Poland; and by virtue of the inſtrument of regency drawn up for this diſtrict in the year 1717, the government is lodged in ſeven Poliſh ſenators or counſellors, from whom an appeal lies to the king. The biſhop of Samogitia alſo ſtyles himſelf biſhop of Pilten.

The moſt remarkable part of this diſtrict is the promontory of Domeſneſs, which projects northward into the gulf of Livonia. From this cape, a ſand-bank runs four German miles farther into the ſea, half of which lies under water, and cannot be diſcerned. To the eaſt of this promontory is an unfathomable abyſs, which is never obſerved to be agitated. For the ſafety of veſſels bound to Livonia, two ſquare beacons have been erected on the coaſt, near Domeſneſs church, oppoſite to the ſand bank, and facing each other. One of theſe is twelve fathoms high, and the other eight; and a large fire is kept burning on them from the firſt of Auguſt to the firſt of January. When the mariners ſee theſe fires appear as one in a direct line, they may conclude that they are clear of the extremity of the ſand bank, and conſequently out of danger; but if they ſee both beacons, they are in danger of running upon it. The diſtrict of Pilten contains ſeven pariſhes, but no towns worthy of notice. The inhabitants are chiefly of the Lutheran perſuaſion.

PILUM, a miſſive weapon uſed by the Roman ſoldiers, and in a charge darted upon the enemy. Its point, we are told by Polybius, was ſo long and ſmall, that after the firſt diſcharge it was generally ſo bent as to be rendered uſeleſs. The legionary ſoldiers made uſe of the pilum, and each man carried two. The pilum underwent many alterations and improvements, inſomuch that it is impoſſible with any preciſion to deſcribe it. Julius Scaliger laboured much to give an accurate account of it, and would have eſteemed ſucceſs on this head amongſt the greateſt bleſſings of his life. This weapon appears, however, to have been ſometimes round, but moſt commonly ſquare, to have been two cubits long in the ſtaff, and to have had an iron point of the ſame length hooked and jagged at the end. Marius made a material improvement in it; for during the Cimbrian war, he ſo contrived it, that when it ſtuck in the enemies ſhield it ſhould bend down in an angle in the part where the wood was connected with the iron, and thus become uſeleſs to the perſon who received it.

PIMENTO, PIEMENTO, JAMAICA PEPPER, or *Allſpice*, a ſpecies of myrtus. See MYRTUS, BOTANY *Index.*

"The pimento trees grow ſpontaneouſly, and in great abundance, in many parts of Jamaica, but more particularly on hilly ſituations near the ſea, on the northern ſide of that iſland; where they form the moſt delicious groves that can poſſibly be imagined; filling the air with fragrance, and giving reality, though in a very diſtant part of the globe, to our great poet's deſcription of thoſe balmy gales which convey to the delighted voyager

'Sabean odours from the ſpicy ſhore
'Of Araby the bleſt.
'Chear'd with the grateful ſmell, old ocean ſmiles.'

"This tree is purely a child of nature, and ſeems to mock all the labours of man in his endeavours to extend or improve its growth: not one attempt in fifty to propagate the young plants, or to raiſe them from the ſeeds, in parts of the country where it is not found growing ſpontaneouſly, having ſucceeded. The uſual method of forming a new pimento plantation (in Jamaica it is called a *walk*) is nothing more than to appropriate a piece of woodland, in the neighbourhood of a plantation already exiſting, or in a country where the ſcattered trees are found in a native ſtate, the woods of which being fallen, the trees are ſuffered to remain on the ground till they become rotten and periſh. In the courſe of twelve months after the firſt ſeaſon, abundance of young pimento plants will be found growing vigorouſly in all parts of the land, being without doubt produced from ripe berries ſcattered there by the birds, while the fallen trees, &c. afford them both ſhelter and ſhade. At the end of two years it will be proper to give the land a thorough cleanſing, leaving ſuch only of the pimento trees as have a good appearance, which will then ſoon form ſuch groves as thoſe I have deſcribed, and, except perhaps for the firſt four or five years, require very little attention afterwards.

"Soon after the trees are in bloſſom, the berries become fit for gathering; the fruit not being ſuffered to ripen on the tree, as the pulp in that ſtate, being moiſt and glutinous, is difficult to cure, and when dry becomes black and taſteleſs. It is impoſſible, however, to prevent ſome of the ripe berries from mixing with the reſt; but if the proportion of them be great, the price of the commodity is conſiderably injured.

"It is gathered by the hand; one labourer on the tree, employed in gathering the ſmall branches, will give employment to three below (who are generally women and children) in picking the berries; and an induſtrious picker will fill a bag of 70lbs in the day.

"The returns from a pimento walk in a favourable ſeaſon are prodigious. A ſingle tree has been known to yield 150 lbs. of the raw fruit, or one cwt. of the dried ſpice; there being commonly a loſs in weight of one third in curing; but this, like many other of the minor productions, is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years."

PIMPINELLA, Burnet Saxifrage: a genus of plants belonging to the pentandria claſs. See Botany *Index*.

PIMPLE, in *Medicine*, a ſmall puſtule ariſing on the face. By mixing equal quantities of the juice of houſeleek (*Sedum minus*), paſſed through paper, and of ſpirit of wine rectified by itſelf, a white coagulum of a very volatile nature is formed, which Dr Bughart commends for curing pimples of the face; and ſays, that the thin liquor ſeparated from it with ſugar-candy is an excellent remedy for thick viſcid phlegm in the breaſt.

PIN, in commerce, a little neceſſary inſtrument made of braſs-wire, chiefly uſed by women in faſtening and adjuſting their dreſs.

In the year 1543, by ſtatute 34 and 35 of Henry VIII. cap. 6. it was enacted, "That no perſon ſhall put to ſale any pinnes but only ſuch as ſhall be double headed, and have the heads ſoldered faſt to the ſhank of the pins, well ſmoothed, the ſhank well ſhapen, the points well and round filed, cauted, and ſharpened." From the above extract it ſhould appear that the art of pin-making was but of late invention, probably introduced from France; and that our manufactories ſince that period have wonderfully improved.

Though pins are apparently ſimple, their manufacture is, however, not a little curious and complex. We ſhall therefore give our readers an account of it from Ellis's *Campagna* of London.

"When the braſs-wire, of which the pins are formed, is firſt received at the manufactory, it is generally too thick for the purpoſe of being cut into pins. The firſt operation therefore is that of winding it off from one wheel to another with great velocity, and cauſing it to paſs between the two, through a circle in a piece of iron of ſmaller diameter: the wire being thus reduced to its proper dimenſions, is ſtraitened by drawing it between iron pins, fixed in a board in a zig-zag manner, but ſo as to leave a ſtraight line between them: afterwards it is cut into lengths of three or four yards, and then into ſmaller ones, every length being ſufficient to make ſix pins; each end of theſe is ground to a point, which was performed when I viewed the manufactory by boys who ſat each with two ſmall grinding ſtones before him, turned by a wheel. Taking up a handful, he applies the ends to the coarſeſt of the two ſtones, being careful at the ſame time to keep each piece moving round between his fingers, ſo that the points may not become flat: he then gives them a ſmoother and ſharper point, by applying them to the other ſtone, and by that means a lad of 12 or 14 years of age is enabled to point about 16,000 pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated till it is cut into ſix pieces. The next operation is that of forming the heads, or, as they term it, *head-ſpinning*; which is done by means of a ſpinning-wheel, one piece of wire being thus with aſtoniſhing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with ſheers; every two circumvolutions or turns of the wire forming one head; theſe are ſoftened by throwing them into iron pans, and placing them in a furnace till they are red hot. As ſoon as they are cold, they are diſtributed to children, who ſit with ſmall anvils and hammers before them, which they work with their feet, by means of a lath, and taking up one of the lengths, they thruſt the blunt end into a quantity of the heads which lie before them, and catching one at the extremity, they apply them immediately to the anvil and hammer, and by a motion or two of the foot, the point and the head are fixed together in much leſs time than it can be deſcribed, and with a dexterity only to be acquired by practice; the ſpectator being in continual apprehenſion

ſion for the ſafety of their fingers ends. The pin is now finiſhed as to its form, but ſtill it is merely braſs; it is therefore thrown into a copper, containing a ſolution of tin and the leys of wine. Here it remains for ſome time; and when taken out aſſumes a white though dull appearance: in order therefore to give it a poliſh, it is put into a tub containing a quantity of bran, which is ſet in motion by turning a ſhaft that runs through its centre, and thus by means of friction it becomes perfectly bright. The pin being complete, nothing remains but to ſeparate it from the bran, which is performed by a mode exactly ſimilar to the winnowing of corn; the bran flying off and leaving the pin behind fit for immediate ſale. I was the more pleaſed with this manufactory, as it appeared to afford employment to a number of children of both ſexes, who are thus not only prevented from acquiring the habits of idleneſs and vice, but are on the contrary initiated in their early years in thoſe of a beneficial and virtuous induſtry." See NEEDLES.

PINACIA, among the Athenians, were tablets of braſs inſcribed with the names of all thoſe citizens in each tribe who were duly qualified and willing to be judges of the court of Areopagus. Theſe tablets were caſt into a veſſel provided for the purpoſe, and the ſame number of beans, a hundred being white and all the reſt black, were thrown into another. Then the names of the candidates and the beans were drawn out one by one, and they whoſe names were drawn out together with the white beans were elected judges or ſenators. In Solon's time there were only four tribes, each of which choſe 100 ſenators; but the number of tribes afterwards increaſing, the number of ſenators and judges increaſed to ſo many hundreds more.

PINANG, the Chineſe name of the *Areca Catechu* Lin. See ARECA, BOTANY *Index*.

PINCHBECK, a factitious metallic ſubſtance, or an alloy of zinc three parts, and of copper, four. See CHEMISTRY *Index*.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his firſt muſical inſtructions from his father, who was a flute-player by profeſſion; after which, according to Suidas, he was placed under Myrtis, a lady of diſtinguiſhed abilities in lyric poetry. It was during this period that he became acquainted with the poeteſs Corinna, who was likewiſe a ſtudent under Myrtis. Plutarch tell us, that Pindar profited from the leſſons which Corinna, more advanced in her ſtudies, gave him at this ſchool. It is very natural to ſuppoſe, that the firſt poetical effuſions of a genius ſo full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preſerved ſix verſes, ſaid to have been the exordium of his firſt eſſay; in which he crowded almoſt all the ſubjects for ſong which ancient hiſtory and mythology then furniſhed. Upon communicating this attempt to Corinna, ſhe told him ſmiling, that he ſhould ſow with the hand, and not empty his whole ſack at once. Pindar, however, ſoon quitted the leading ſtrings of theſe ladies, his poetical nurſes, and became the diſciple of Simonides, now arrived at extreme old age: after which he ſoon ſurpaſſed all his maſters, and acquired great reputation over all Greece: but, like a true prophet, he was leſs honoured in his own country than elſewhere; for at Thebes he was frequently pronounced to be vanquiſhed, in the muſical and poetical conteſts, by candidates of inferior merit.

The cuſtom of having theſe public trials of ſkill in all the great cities of Greece was now ſo prevalent, that but little fame was to be acquired by a muſician or poet any other way than by entering the liſts; and we find, that both Myrtis and Corinna publicly diſputed the prize with him at Thebes. He obtained a victory over Myrtis, but was vanquiſhed five different times by Corinna. The judges, upon occaſions like theſe, have been frequently accuſed of partiality or ignorance, not only by the vanquiſhed, but by poſterity; and if the merit of Pindar was pronounced inferior to that of Corinna five ſeveral times, it was, ſays Pauſanias, becauſe the judges were more ſenſible to the charms of beauty than to thoſe of muſic and poetry (A). Was is not ſtrange, ſaid the Scythian Anacharſis, that the Grecian artiſts were never judged by artiſts, their peers?

Pindar, before he quitted Thebes, had the vexation to ſee his Dithyrambics traduced, abuſed, and turned into ridicule, by the comic poets of his time; and Athenæus tells us, that he was ſeverely cenſured by his brother lyrics, for being a lipogrammatiſt, and compoſing an ode from which he had excommunicated the letter S. Whether theſe cenſures proceeded from envy or contempt cannot now be determined; but they were certainly uſeful to Pindar, and it was neceſſary that he ſhould be laſhed for ſuch puerilities. Thebes ſeems to have been the purgatory of our young bard: when he quitted that city, as his judgement was matured, he avoided moſt of the errors for which he had been chaſtiſed, and ſuddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, deſirous of laſting fame, courted the muſe of Pindar.

He ſeems frequently to have been preſent at the four great feſtivals, of the Olympian, Pythian, Nemean, and Iſthmian games, as may be inferred from ſeveral circumſtances and expreſſions in the odes which he compoſed for the victors in them all. Thoſe at Olympia, who were ambitious of having their atchievements celebrated by Pindar, applied to him for an ode, which was firſt ſung in the Prytaneum or town-hall of Olympia, where there was a banqueting room, ſet apart for the entertainment of the conquerors. Here the ode was rehearſed by a chorus, accompanied by inſtruments. It was afterwards performed in the ſame manner at the triumphal entry of the victor into his own country, in proceſſions, or at the ſacrifices that were made with great pomp and ſolemnity on the occaſion.

(A) Pauſanias ſays, that Corinna was one of the moſt beautiful women of her time, as he judged by a picture of her which he ſaw at Tanagris at the place where the public exerciſes were performed. She was repreſented with her head ornamented by a riband, as a memorial of the victories ſhe had obtained over Pindar at Thebes.

Pindar, in his ſecond Iſthmian ode, has apologized for the mercenary cuſtom among poets, of receiving money for their compoſitions. "The world (ſays he) is grown intereſted, and thinks in general with the Spartan philoſopher Ariſtodemus, that *money only makes the man*: a truth which this ſage himſelf experienced, having with his riches loſt all his friends." It is ſuppoſed that Pindar here alludes to the avarice of Simonides, who firſt allowed his muſe to ſell her favours to the higheſt bidder.

There is no great poet in antiquity whoſe moral character has been leſs cenſured than that of Pindar. Plutarch has preſerved a ſingle verſe of his *Epicedium* or *Dirge* that was ſung at his funeral; which, ſhort and ſimple as it is, implies great praiſe: *This man was pleaſing to ſtrangers, and dear to his fellow-citizens.* His works abound with precepts of the pureſt morality; and it does not appear that he ever traduced even his enemies; comforting himſelf, for their malignity, by a maxim which he inſerted in his firſt *Pythic*, and which afterwards became proverbial, *That it is better to be envied than pitied.*

Pauſanias ſays, that the character of poet was truly conſecrated, in the perſon of Pindar, by the god of verſe himſelf; who was pleaſed, by an expreſs oracle, to order the inhabitants of Delphos to ſet apart for Pindar one half of the firſt fruit offerings brought by the religious to his ſhrine, and to allow him a conſpicuous place in his temple, where, in an iron chair, he uſed to ſit and ſing his hymns in honour of that god. This chair was remaining in the time of Pauſanias, ſeveral centuries after, and ſhown to him as a relick not unworthy of the ſanctity and magnificence of that place.

But though Pindar's muſe was penſioned at Delphos, and well paid by princes and potentates elſewhere, ſhe ſeems, however, ſometimes to have ſung the ſpontaneous ſtrains of pure friendſhip. Of this kind were, probably, the verſes beſtowed upon the muſician Midas, of Agrigentum in Sicily, who had twice obtained the palm of victory by his performance on the flute at the Pythic games (B). It is in his 12th Pythic ode that Pindar celebrates the victory of Midas *over all Greece, upon that inſtrument which Minerva herſelf had invented* (C)

Fabricius tells us, that Pindar lived to the age of 90; and, according to the chronology of Dr Blair, he died 435 years B. C. aged 86. His fellow citizens erected a monument to him in the Hippodrome at Thebes, which was ſtill ſubſiſting in the time of Pauſanias; and his renown was ſo great after his death, that his poſterity derived very conſiderable honours and privileges from it. When Alexander the Great attacked the city of Thebes, he gave expreſs orders to his ſoldiers to ſpare the houſe and family of Pindar. The Lacedemonians had done the ſame before this period; for when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet: *Forbear to burn this houſe, it was the dwelling of Pindar.* Reſpect for the memory of this great poet continued ſo long, that, even in Plutarch's time, the beſt part of the ſacred victim at the Theoxenian feſtival was appropriated to his deſcendants.

PINDARIC ODE, in *Poetry*, an ode formed in imitation of the manner of Pindar. See POETRY, n° 139, &c.

PINDUS, in *Ancient Geography*, not a ſingle mountain, but a chain of mountains, inhabited by different people of Epirus and Theſſaly; ſeparating Macedonia, Theſſaly, and Epirus: An extenſive chain, having Macedonia to the north, the Perrhæbi to the eaſt, the Dolopes to the ſouth, and the mountain itſelf in Theſſaly (Strabo).

PINDUS, a Doric city of Doris, ſituated on the cognominal river, which falls into the Cephiſſus (Strabo.)

PINE, in *Botany*. See PINUS, BOTANY *Index*.

Pine-Apple. See BROMELIA, BOTANY *Index*; and for an account of the mode of cultivating the pine apple, ſee GARDENING.

PINEA, or PIGNE, in commerce, is a term uſed in Peru and Chili, for a kind of light, porous maſſes, or lumps, formed of a mixture of mercury and ſilver-duſt from the mines. The ore, or mineral, of ſilver, when dug out of the veins of the mine, is firſt broken and then ground in mills for the purpoſe, driven by water, with iron peſtles, each of 200 pounds weight. The mineral, when thus pulverized, is next ſifted, and then worked up with water into a paſte; which, when half dry, is cut into pieces, called *cuerpos*, a foot long, weighing each about two thouſand five hundred pounds.

Each piece or cuerpo is again kneaded up with ſea-ſalt, which, diſſolving, incorporates with it. They then add mercury, from 10 to 20 pounds for each cuerpo, kneading the paſte afreſh until the mercury be incorporated therewith. This office, which is exceedingly dangerous on account of the noxious qualities of the mercury, is always made the lot of the poor Indians. This amalgamation is continued for eight or nine days; and ſome add lime, lead, or tin ore, &c. to forward it; and, in ſome mines, they are obliged to uſe fire. To try whether or no the mixture and amalgamation be ſufficient, they waſh a piece in water; and if the mercury be white, it is a proof that it has had its effect; if black, it muſt be ſtill farther worked.

(B) This Midas is a very different perſonage from his long-eared majeſty of Phrygia, whoſe deciſion in favour of Pan had given ſuch offence to Apollo; as is manifeſt, indeed, from his having been cotemporary with Pindar.

(C) The moſt extraordinary part of this muſician's performance that can be gathered from the ſcholiaſt upon Pindar, was his finiſhing the ſolo, without a reed or mouth piece, which broke accidentally while he was playing. The legendary account given by the poet in this ode, of the occaſion upon which the flute was invented by Minerva, is diverting: "It was (ſays he) to imitate the howling of the Gorgons, and the hiſſing of their ſnakes, which the goddeſs had heard when the head of Meduſa (one of theſe three amiable graces) was cut off by Perſeus."

ed. When finiſhed, it is ſent to the lavatories, which are large baſons that empty ſucceſſively into one another. The paſte, &c. being laid in the uppermoſt of theſe, the earth is then waſhed from it into the reſt by a rivulet turned upon it; an Indian, all the while, ſtirring it with his feet, and two other Indians doing the like in the other baſons. When the water runs quite clear out of the baſons, the mercury and ſilver are found at bottom incorporated. This matter they call *pella*, and of this they form the pineas, by expreſſing as much of the mercury as they can; firſt, by putting it in woollen bags, and preſſing and beating it ſtrongly; then, by ſtamping it in a kind of wooden mould, of an octagonal form, at bottom whereof is a braſs plate pierced full of little holes. The matter, when taken out of the mould, is laid on a trivet, under which is a large veſſel full of water; and the whole being covered with an earthen head, a fire is made round it.

The mercury ſtill remains in the maſs, and is thus reduced into fumes, and, at length condenſing, it is precipitated into the water, leaving behind it a maſs of ſilver grains of different figures, which, only joining or touching at the extremes, render the matter very porous and light. This, therefore, is the pinea, or pigne, which the workmen endeavour to ſell ſecretly to veſſels trading to the South ſea; and from which thoſe, who have ventured to engage in ſo dangerous a commerce, have made ſuch vaſt gains. Indeed the traders herein muſt be very careful; for the Spaniſh miners are arrant knaves, and to make the pignes weigh the more, they often fill the middle with ſand or iron.

PINEAL GLAND. See BRAIN, ANATOMY *Index*.

PINEAU, GABRIEL DU, a diſtinguiſhed lawyer, was born at Angers in 1573. He went afterwards to Paris, and pled with eclat before the parliament and great council. Upon his return to Angers, he became a counſellor in the preſidial court. He was conſulted by all the neighbouring provinces, and had an active hand in all the great affairs of his time. Mary de Medicis conferred upon him the office of maſter of requeſts, and in her diſgrace wiſhed to ſupport herſelf by his credit and counſels; but Du Pineau, always attentive to what he owed on the one hand to the mother of his king, and on the other to the king himſelf, never ceaſed to inſpire that princeſs with ſentiments of peace.

In 1632 Louis XIII. by way of reward, appointed him mayor and captain-general of the city of Angers; a ſituation in which he merited the flattering title of *Father of the People.* He had no reſpect of perſons; for he was equally acceſſible to the poor and the great. This worthy citizen died the 15th of October 1644, at the age of 71. His houſe was a kind of academy, where regular conferences were held, and attended by young officers, advocates, and other literary characters. In thoſe conferences every one freely ſtated the difficulties which occurred to him upon ſubjects either of law or hiſtory; and when Pineau ſpoke, all was made clear; but he was always the laſt in delivering his ſentiments, becauſe he perceived that too much deference was paid to his opinion. His writings are, 1. Latin notes, in addition to thoſe of Du Moulin, upon the canon law, and printed along with the works of that eminent lawyer by the care of Francis Pinſon. 2. Commentaries, obſervations, and conſultations, upon ſeveral important queſtions reſpecting the laws both of Anjou and of France, with ſome diſſertations upon different ſubjects, &c. reprinted in 1725, in 2 vol. folio, by the care of Livoniere, who has enriched them with very uſeful remarks. The editor ſays, that "Du Pineau is a little inferior to the celebrated Du Moulin on the civil law, but that he is more accurate than the other upon the canon law."—Menage made theſe two verſes upon his death:

> *Pinellus periit, Themidis pius ille ſacerdos,*
> *In proprio judex limine perpetuus.*

PINEDA, JOHN, a writer of hiſtory, was born at Seville of a noble family, and entered into the ſociety of Jeſuits in 1572. He taught philoſophy and divinity in ſeveral colleges; and devoted his time to the ſtudy of the Holy Scriptures. That he might render that ſtudy the eaſier, he made himſelf maſter of the oriental languages. We have of his writings, 1. Two volumes of Commentaries upon the book of Job, in folio. 2. Two upon Eccleſiaſtes. 3. A General Hiſtory of the Church, in Spaniſh, 4 vol. in folio. 4. A Hiſtory of Ferdinand III. in the ſame language, in folio. He died in 1637, much regretted by the members of his ſociety, and by the public in general.

PINELLI, JOHN VINCENT, a diſtinguiſhed literary character, was born at Naples, and was ſon of Count Pinelli, a noble Genoeſe, who had ſettled in that city, and had acquired a handſome fortune in the way of trade. After receiving a liberal education, he quitted the place of his nativity, and repaired to Padua, where he took up his reſidence at the age of 24. Being a great lover of ſcience, he gave a preference to that city on account of its famous univerſity, which brought to it a number of learned men. He had an excellent library, which conſiſted of a choice collection of books and manuſcripts, and which he continued to enrich till the hour of his death. His literary correſpondence, not only in Italy, but through the moſt of Europe, procured him all the new works which were worthy of a place in his collection. The authors themſelves were often forward to pay their reſpects to him. In many cities of Italy he had perſons employed to ſearch, at leaſt once a month, the ſtalls of thoſe artificers who make uſe of old parchments, ſuch as lute-makers, ſievewrights, and others; and by this means he had the good fortune often to ſave from deſtruction ſome valuable fragments. His paſſion for knowledge embraced all the ſciences; but hiſtory, medals, antiquities, natural hiſtory, and particularly botany, were his favourite ſtudies. He was conſulted from all quarters, and the extent of his acquaintance with the learned world was very great. He correſponded with Juſtus Lipſius, Joſeph Scaliger, Sigonius, Poſſevin, Peter Pithou, and a great many others, who have all paid the higheſt compliments to his erudition. Inſenſible to all the pleaſures of life, and acquainted only with thoſe of the mind, he had a great diſlike to plays, entertainments, ſhows, and every thing which moſt excites the curioſity of other men. During the ſpace of 43 years that he lived at Padua, he was never known to be out of the city but twice; once on occaſion of a plague which infeſted it; and afterwards on a voyage to Naples, which he made at the earneſt ſolicitation of his friends. In ſhort, Pinelli was generous, ſympathiſing, and compaſſionate, particularly to men of letters, whoſe wants he often anticipated. His zeal for the progreſs and advancement of ſcience rendered him very communicative of his knowledge and of his books; but this was always done with judgement and diſcretion. He died in 1601, aged 68, without having publiſhed any work. Paul Gualdo, who has written Pinelli's life, does not ſpecify the number of volumes of which his rich library conſiſted: he only informs us, that when it was tranſported by ſea to Naples, it was packed up in 130 cheſts, of which 14 contained manuſcripts; but it did not go wholly to his heirs. The ſenate of Venice cauſed their ſeal to be ſet upon the manuſcripts, and took away whatever concerned the affairs of the republic, to the number of 200 pieces.—"I compare (ſays Preſident de Thou) Pinelli to Titus Pomponius; for, as that illuſtrious Roman was called *Atticus*, Pinelli alſo bore the title of *Venetian*, on account of the great affection which the republic of Venice had for him.

PINET, Antony du, lord of Noroy, an eccleſiaſtical writer, lived in the 16th century, and was a native of Beſançon. He was ſtrongly attached to the Proteſtant religion, and a bitter enemy to the church of Rome. His book, entitled *La Conformité des Egliſes Reformées de France, and de l'Egliſe primitive*, printed at Lyons, 1564, in 8vo; and the notes which he added to the French tranſlation of the Fees of the Pope's Chancery, which was printed at Lyons, in 8vo, 1564, and reprinted at Amſterdam in 1700, in 12mo, plainly diſcover his ſentiments. He publiſhed the laſt mentioned performance under this title: *Taxe des parties caſuelles de la boutique du Pape*, in Latin and French, with ſome notes taken from decrees, councils, and canons, in order to aſcertain the diſcipline anciently obſerved in the church. In the epiſtle dedicatory, he aſſumes the tone of a declared enemy to the court of Rome. He apologizes for having preſented this book "to a ſociety ſo holy as yours (the Proteſtants), in which are heard only hymns, pſalms, and praiſes, to the Lord our God: but it is proper to ſhow to the villain his villany, and the fool his folly, leſt one ſhould be thought to reſemble them." We ſee by this ſpecimen, that Pinet had no more politeneſs in his ſtyle than in his manners. His tranſlation of Pliny's Natural Hiſtory, printed at Lyons in 2 vols. folio, 1566, and at Paris, 1608, was formerly much read. Though there are a good many errors in it, it is yet very uſeful at preſent, eſpecially for thoſe who underſtand Pliny's Latin, on account of the tranſlator's reſearches, and a great number of marginal notes. Pinet alſo publiſhed Plans of the principal fortreſſes in the world at Lyons, 1564, in folio.

PING LEANG FOU, a city of China in the province of Chen-ſi. It is one of the moſt conſiderable cities of the weſtern part of the province, and is ſituated on the river Kin-ho. The air here is mild; and the agreeable views which the ſurrounding mountains preſent, added to the ſtreams which water the country, render it a very delightful reſidence. It has under its juriſdiction three cities of the ſecond claſs and ſeven of the third. In this diſtrict is a valley ſo deep and narrow, that it is almoſt impervious to the ſun; a large highway, paved with ſquare ſtones, runs through it.

PINGUICULA, Butterwort; a genus of plants belonging to the diandria claſs. See Botany *Index*.

PINGUIN, or Penguin, in *Ornithology*, a genus of birds of the order anſeres. See Aptenodytes, Ornithology *Index*, or page 5[illegible].

PINION, in *Mechanics*, an arbor, or ſpindle, in the body whereof are ſeveral notches, which catch the teeth of a wheel that ſerves to turn it round; or it is a leſſer wheel that plays in the teeth of a larger.

PINK, a name given to a ſhip with a very narrow ſtern; whence all veſſels, however ſmall, whoſe ſterns are faſhioned in this manner, are called *pink-ſterned*.

Pink. See Dianthus, Botany *Index*.

PINNA, in *Zoology*, a genus of ſhell-fiſh belonging to the order of vermes teſtacea. See Conchology *Index*.—Pliny, who gives ſome account, not however very correct, of the hiſtory of ſome of the ſpecies of this genus, (lib. ix. 51.) ſays, the ſmalleſt of all the kinds is called the *pinnoteres*, and therefore liable to injury; this has the prudence to hide itſelf in the ſhells of oyſters. Again, lib. ix. 66. he ſays, the pinna is of the genus of ſhell-fiſh; it is produced in muddy waters, always erect, nor ever without a companion, which ſome call the *pinnoteres*, others the *pinnophylax*. This ſometimes is a ſmall ſquill, ſometimes a crab, that follows the pinna for the ſake of food. The pinna, upon opening its ſhell, expoſes itſelf as a prey to the ſmalleſt kind of fiſhes; for they immediately aſſault her, and, growing bolder upon finding no reſiſtance, venture in. The guard, watching its time, gives notice by a bite; upon which the pinna, cloſing its ſhell, ſhuts in, kills, and gives part of whatever happens to be there to its companion.

> The pinna and the crab together dwell,
> For mutual ſuccour, in one common ſhell.
> They both to gain a livelihood combine;
> That takes the prey, when this has given the ſign.
> From hence this crab, above his fellows fam'd,
> By ancient Greeks was *pinnoteres* nam'd.—Oppian.

PINNACE, a ſmall veſſel navigated with oars and ſails, and having generally two maſts, which are rigged like thoſe of a ſchooner.

Pinnace is alſo a boat uſually rowed with eight oars. See the article Boat.

PINNACLE, in *Architecture*, the top or roof of a houſe, terminating in a point. This kind of roof among the ancients was appropriated to temples; their ordinary roofs were all flat, or made in the platform way.

PINNATED leaves. See Botany *Index*.

PINNATIFID leaves. See Botany *Index*.

PINNOTERES, or Pinnophylax, is a kind of crab-fiſh, furniſhed with very good eyes. It is ſaid to be the companion of the pinna marina. They live and lodge together in the ſame ſhell, which belongs to the latter. When it has occaſion to eat, it opens its valves, and ſends out its faithful purveyor to procure food. If during their labour the pinnoterus perceives the polypus, it immediately returns to warn its blind friend of the danger, when, by ſhutting its valves, it eſcapes the rage of its enemy; but when the pinnoterus loads itſelf with booty without moleſtation, it makes a gentle noiſe at the opening of the ſhell, and when admitted the two friends feaſt on the fruits of its induſtry. See Pinna, &c.

PINT (*pinta*), a veſſel, or meaſure, uſed in eſtimating the quantity of liquids, and even ſometimes of dry things.—Budæus derives the word from the Greek πινθα; others from the German *pint*, a little meaſure of wine; Nicod from the Greek πινειν, "to drink."

The *Engliſh pint* is twofold; the one for wine meaſure, the other for beer and ale meaſure. See Measure.

PINTADA, a ſpecies of Procellaria.

PINTLES, certain pints or hooks faſtened upon the back part of the rudder, with their points downwards, in order to enter into, and reſt upon, the *googings*, fixed in the ſtern-poſt, to hang the rudder. See Helm.

PINTOR, Peter, phyſician, was born at Valentia in Spain, in the year 1420, and was phyſician to Alexander VI. whom he followed to Rome, where he practiſed with great ſucceſs. He has left behind him two performances of conſiderable merit, 1. *Aggregator Sententiarum Doctorum de Curatione in Peſtilentia*, printed at Rome 1409, in folio. 2. *De Morbo Fœdo et Occulto his Temporibus Affligenti*, &c. printed at Rome, 1500, in 4to, black letter: a book extremely ſcarce, unknown to Luiſini and Aſtruc, and which traces the venereal diſeaſe to the year 1496. Pintor died at Rome in 1503, aged 83 years.

PINTURICCIO, Bernardino, a celebrated Italian painter, was born at Peruſia in 1454. He was the diſciple of Peter Perugino, under whom he became ſo good an artiſt, that he employed him on many occaſions as his aſſiſtant. He principally painted hiſtory and groteſque; but he alſo excelled in portraits, among which thoſe of Pope Pius II. and Innocent VIII. of Giulia Farneſe, Cæſar Borgia, and Queen Iſabella of Spain, are particularly diſtinguiſhed. The moſt memorable performance of Pinturiccio is the hiſtory of Pius II. painted in ten compartments in the monaſtery of Siena; in which undertaking, Raphael, then a young man, and bred under the ſame maſter, aſſiſted him ſo far as to ſketch out cartoons of many parts of the compoſition. The ſtory of his death is worth relating, eſpecially as it illuſtrates his character. The laſt work he was engaged in was a *Nativity* for the monaſtery of St Francis at Siena: the monks accommodated him with a chamber to work in, which they cleared of all the furniture, except one old trunk or cheſt that appeared too rotten to move; but Pinturiccio, naturally poſitive and peeviſh, inſiſted on its being taken away, and the monks, willing to gratify him, complied. It was no ſooner ſtirred than one of the planks burſting, out tumbled 500 pieces of gold, which had been ſecreted there for many years. The monks were overjoyed at finding this treaſure, and the painter proportionably mortified at loſing his chance of the diſcovery by his indiſcreet obſtinacy: it affected his ſpirits ſo much that he ſurvived but a few months, and it was generally conſidered as the cauſe of his death.

PINUS, the Pine-tree; a genus of plants belonging to the monœcia claſs. See Botany *Index*. The pine-tree was well known to the ancients, and has been deſcribed and celebrated both by their philoſophers and poets. Pliny enumerates no leſs than ſix ſpecies of trees of this genus; and it is mentioned by Virgil both in his Eclogues, his Georgics, and his Æneid; by Horace in his Odes; by Ovid in his Metamorphoſes; by Statius; and by Catullus, &c. Macrobius relates an anecdote concerning the cones of pine-trees, which in common language were called *poma pinea*, "pine-apples." There lived in the Auguſtan age one Vatinius, who by ſome means had irritated the Roman people ſo much that they pelted him with ſtones. When he entertained them with gladiators, to ſave himſelf from ſuch treatment for the future, he procured an edict from the ediles, that no perſon ſhould throw any thing but apples in the amphitheatre. It accidentally happened that at this time Caſcellius, eminent for his wit as well as knowledge of the law, was conſulted on the queſtion, whether a pine-apple (the cone of the pine) was legally included in the term *pomum*, "an apple?" It is an apple (ſaid he) if you intend to fling it at Vatinius *. A deciſion by which the edict in his favour did not much mend his ſituation: for Martial repreſents it dangerous to come under this tree, becauſe the cones in his time were of ſo great a ſize and weight, probably enlarged by cultivation for ages.

Nuces Pineæ.

Poma ſumus Cybeles: procul hinc diſcede, viator,
Ne cadat in miſerum noſtra ruina caput †.

There are generally reckoned 14 ſpecies of this genus; of which the moſt remarkable are theſe following:

1. The *pinea*, *pineaſter*, or wild pine, grows naturally on the mountains in Italy and the ſouth of France. It grows to the ſize of a large tree; the branches extend to a conſiderable diſtance; and while the trees are young, they are fully garniſhed with leaves, eſpecially where they are not ſo cloſe as to exclude the air from thoſe within; but as they advance in age, the branches appear naked, and all thoſe which are ſituated below become unſightly in a few years; for which reaſon they are now much leſs in eſteem than formerly.

2. The *pinus pinea*, or ſtone pine, is a tall evergreen tree, native of Italy and Spain. It delights in a ſandy loam, though like moſt others it will grow well in almoſt any land. Reſpecting the uſes of this ſpecies, Hanbury tells us that "the kernels are eatable, and by many preferred to almonds. In Italy they are ſerved up at table in their deſſerts.—They are exceeding wholeſome, being good for coughs, colds, conſumptions, &c. on which account only this tree deſerves to be propagated." Hanbury continues: "It may be very proper here to take notice of a very great and dangerous miſtake Mr Miller has committed, by ſaying, under this article of ſtone-pine, that ſeeds kept in the cones will be good, and grow if they are ſown ten or twelve years after the cones have been gathered from the trees; whereas the ſeeds of this ſort, whether kept in the cones or taken out, are never good after the firſt year; and though ſometimes a few plants will come up from the ſeeds that are kept in the cones for two years before, yet this is but ſeldom; neither muſt a tenth part of a crop be expected. This caution is the more neceſſary, as ſeveral gentlemen who had cones, upon reading Mr Miller's book, and finding the ſeeds would take no damage when kept there, deferred the work for a ſeaſon or two, when they thought they ſhould have more conveniency either of men or ground for their purpoſe; and were afterwards wholly diſappointed, no plants appearing,

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* *Saturn.* lib. ii. cap. 6.

† Lib. xiii. Ep. 25.

Pinus.

pearing, the ſeeds being by that time ſpoiled and worth nothing."

3. The *rubra*, commonly called the *Scots fir* or *pine*. It is common throughout Scotland, whence its name; though it is alſo found in moſt of the other countries of Europe. M. du Hamel, of the Royal Academy of Sciences, mentions his having received ſome ſeeds of it from St Domingo in the Weſt Indies; and thence concludes, that it grows indifferently in the temperate, frigid, and torrid zones. The wood of this tree is the red or yellow deal, which is the moſt durable of any of the kinds yet known. The leaves of this tree are much ſhorter and broader than thoſe of the former ſort, of a grayiſh colour, growing two out of one ſheath; the cones are ſmall, pyramidal, and end in narrow points; they are of a light colour, and the ſeeds are ſmall.

4. The *pinus picea*, or yew-leaved fir, is a tall evergreen, and a native of Scotland, Sweden, and Germany. This ſpecies includes the ſilver fir and the balm of Gilead fir. The firſt of theſe is a noble upright tree. Mr Marſham ſays, "The talleſt trees I have ſeen were ſpruce and ſilver firs in the valleys in Switzerland. I ſaw ſeveral firs in the dockyards in Venice 40 yards long; and one of 39 yards was 18 inches diameter at the ſmall end. I was told they came from Switzerland."

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The branches are not very numerous, and the bark is ſmooth and delicate. The leaves grow ſingly on the branches, and their ends are ſlightly indented. Their upper ſurface is of a fine ſtrong green colour, and their under has an ornament of two white lines running lengthwiſe on each ſide the midrib; on account of which ſilvery look this ſort is called the *ſilver fir*. The cones are large, and grow erect; and, when the warm weather comes on, they ſoon ſhed their ſeeds; which ſhould be a caution to all who wiſh to raiſe this plant, to gather the cones before that happens.

The balm of Gilead fir has of all the ſorts been moſt coveted, on account of the great fragrance of its leaves; though this is not its only good property: for it is a very beautiful tree, naturally of an upright growth, and the branches are ſo ornamented with their balmy leaves, as to exceed any of the other ſorts in beauty. The leaves, which are very cloſely ſet on the branches, are broad; and their ends are indented. Their upper ſurface, when healthy, is of a fine dark-green colour, and their under has white lines on each ſide the midrib lengthwiſe, nearly like thoſe of the ſilver fir. Theſe leaves when bruiſed are very finely ſcented; and the buds, which ſwell in the autumn for the next year's ſhoot, are very ornamental all winter, being turgid, and of a fine brown colour: and from theſe alſo exudes a kind of fine turpentine, of the ſame kind of (though heightened) fragrancy. The tree being wounded in any part, emits plenty of this turpentine; and Hanbury ſays, "it is ſuppoſed by many to be the ſort from whence the balm of Gilead is taken, which occaſions this tree being ſo called. But this is a miſtake; for the true balm of Gilead is taken from a kind of terebinthus: though I am informed, that what has been collected from this tree has been ſent over to England from America (where it grows naturally), and often ſold in the ſhops for the true ſort."

The ſilver fir is very hardy, and will grow in any ſoil or ſituation, but always makes the greateſt progreſs in rich loamy earth. The balm of Gilead fir muſt be planted in deep, rich, good earth; nor will it live long in any other. The ſoil may be a black mould, or of a ſandy nature, if it be deep enough, and if the roots have room enough to ſtrike freely.

Pinus.

5. The *pinus abies*, or European ſpruce fir, a native of the northern parts of Europe and of Aſia, includes the Norway ſpruce and long-coned Corniſh fir. The former of theſe is a tree of as much beauty while growing as its timber is valuable when propagated on that account. Its growth is naturally like the ſilver, upright; and the height it will aſpire to may be eaſily conceived, when we ſay that the white deal, ſo much coveted by the joiners, &c. is the wood of this tree; and it may perhaps ſatisfy the curious reader to know, that from this fir pitch is drawn. The leaves are of a dark-green colour; they ſtand ſingly on the branches, but the younger ſhoots are very cloſely garniſhed with them. They are very narrow; their ends are pointed; and they are poſſeſſed of ſuch beauties as to excite admiration. The cones are eight or ten inches long, and hang downwards.

The better the ſoil is, the faſter will the ſpruce fir grow, though it will thrive very well in moſt of our Engliſh lands. In ſtrong loamy earth it makes a ſurpriſing progreſs; and it delights in freſh land of all ſorts, which never has been worn out by ploughing, &c. though it be ever ſo poor. The long-coned Corniſh fir differs ſcarcely in any reſpect from the Norway ſpruce, except that the leaves and the cones are larger.

6. The *pinus Canadenſis*, American or Newfoundland ſpruce fir, a native of Canada, Pennſylvania, and other parts of North America, includes three varieties. The white Newfoundland ſpruce, the red Newfoundland ſpruce, and the black Newfoundland ſpruce. Theſe, however, differ ſo little, that one deſcription is common to them all. They are of a genteel upright growth, though they do not ſhoot ſo freely or grow ſo faſt with us as the Norway ſpruce. The leaves are of the ſame green, and garniſh the branches in the ſame beautiful manner as thoſe of that ſpecies; only they are narrower, ſhorter, and ſtand cloſer. The greateſt difference is obſervable in the cones; for theſe are no more than about an inch in length, and the ſcales are cloſely placed. In the cones, indeed, conſiſts the difference of theſe three ſorts: thoſe of the white ſpecies are of a very light brown colour; thoſe of the red ſpecies more of a nut brown or reddiſh colour; and thoſe of the black ſpecies of a dark or blackiſh colour. Beſides this, there is ſcarcely any material difference; though it is obſervable, that this trifling variation ſeems to be pretty conſtant in the plants raiſed from the like ſeeds. Theſe ſorts will often flower, and produce cones when only about five or ſix feet high; and indeed look then very beautiful: but this is a ſign of weakneſs in the plant, which it does not often fairly get over.

7. The *pinus balſamea*, or hemlock fir, a native of Virginia and Canada, poſſeſſes as little beauty as any of the fir tribe; though, being rather ſcarce in proportion, it is deemed valuable. It is called by ſome the *yew-leaved fir*, from the reſemblance of the leaves to thoſe of the yew-tree. It is a tree of low growth, with few branches; and theſe are long and ſlender, and ſpread abroad without order. The leaves do not garniſh the

branches ſo plentifully as thoſe of any other ſort of fir. The cones are very ſmall and rounded; they are about half an inch long, and the ſcales are looſely arranged. We receive theſe cones from America, by which we raiſe the plants; though this caution ſhould be given to the planter, that this tree is fond of moiſt rich ground, and in ſuch a kind of ſoil will make the greateſt progreſs.

8. The *pinus orientalis*, or oriental fir, a native of the Eaſt, is a low but elegant tree. The leaves are very ſhort, and nearly ſquare. The fruit is exceeding ſmall, and hangs downward; and the whole tree makes an agreeable variety with the other kinds.

9. The *ſtrobus*, Lord Weymouth's pine, or North American white pine. This grows ſometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very ſmooth and delicate, eſpecially when young; the leaves are long and ſlender, five growing out of one ſheath; the branches are pretty cloſely garniſhed with them, and thus make a fine appearance. The cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring; ſo that if they are not gathered in winter, the ſcales open and let out the ſeeds. The wood of this ſort is eſteemed for making maſts for ſhips. In Queen Anne's time there was a law made for the preſervation of theſe trees, and for the encouragement of their growth in America. Within theſe laſt 50 years they have been propagated in Britain in conſiderable plenty.

With reſpect to the culture of this ſpecies, Mr Hanbury, after ſome more general directions, continues thus, "I have known ſome gentlemen, who, in attempting to raiſe theſe trees, have ſeen the young plants go off without perceiving the cauſe; and the more watering and pains they have taken, have found the plants periſh in this way more and more, to their great mortification and aſtoniſhment. In the ſpring following theſe plants ſhould be pricked out in beds half a foot aſunder each way; and here they may ſtand two years, when they may be either finally planted out, or removed into the nurſery, at the diſtance of one foot aſunder, and two feet in the rows. If care has been taken of them in the nurſery, they may be removed at a conſiderable height with great aſſurance of ſucceſs: for it is much eaſier to make this pine grow than any of the other ſorts: ſo that where they are wanted for ornament in parks, open places, &c. a ſhow of them may be made in a little time.

" The ſoil the Weymouth pine delights in moſt is a ſandy loam; but it likes other ſoils of an inferior nature: and although it is not generally to be planted on all lands like the Scotch fir, yet I have ſeen it luxuriant and healthy, making ſtrong ſhoots, on blue and red clays, and other ſorts of ſtrong ground. On ſtony and flinty ground, likewiſe, I have ſeen ſome very fine trees; ſo that I believe whoever is deſirous of having plantations of this pine, need not be curious in the choice of his ground."

10. The *pinus tæda*, or ſwamp-pine, is a tall evergreen tree, a native of the ſwamps of Virginia and Canada. There are ſeveral varieties of this genus which Hanbury enumerates and deſcribes: ſuch as, 1ſt, The three-leaved American ſwamp-pine. 2d, The two-leaved American pine. 3d, The yellow American pine, the yellow tough pine, and the tough pine of the plains; among which there is but little variety. 4th, The baſtard pine. 5th, The frankincenſe pine. And 6th, The dwarf pine.

" There are (continues our author) many other ſorts of American pines, which we receive from thence with the like coarſe names of thoſe of the above, which I have choſen to retain, as they will probably be continued to be ſent over; and that the gardener receiving them as ſuch may beſt know what to do with them. In many of theſe ſorts I ſee at preſent no material difference; ſo am induced to think they are the ſame, ſent over with different names. Some of the ſorts above mentioned differ in very few reſpects; but I have choſen to mention them, as a perſon may be ſupplied with the ſeeds from Penſylvania, Jerſey, Virginia, Carolina, &c. where they all grow naturally: and having once obtained the ſeeds, and from them plants, they will become pleaſing objects of his niceſt obſervation."

11. The *pinus cedrus*, ranked by Tournefort and others under larix, famous for its duration, is that popularly called by us the *cedar of Lebanon*, by the ancients *cedrus magna* or the *great cedar*, alſo *cedrelate*, κεδρελατη; and ſometimes the Phœnician or Syrian cedar, from the country where it grows in its greateſt perfection. It is a coniferous evergreen, of the bigger ſort, bearing large roundiſh cones of ſmooth ſcales, ſtanding erect, the leaves being ſmall, narrow, and thick ſet.— They ſometimes counterfeit cedar, by dying wood of a reddiſh hue: but the ſmell diſcovers the cheat, that of true cedar being very aromatic. In ſome places, the wood of the cajou-tree paſſes under the name of cedar, on account of its reddiſh colour and its aromatic ſmell, which ſomewhat reſemble that of ſantal. Cedar-wood is reputed almoſt immortal and incorruptible; a prerogative which it owes chiefly to its bitter taſte, which the worms cannot endure. For this reaſon it was that the ancients uſed cedar tablets to write upon, eſpecially for things of importance, as appears from that expreſſion of Perſius, *Et cedro digna locutus*. A juice was alſo drawn from cedar, with which they ſmeared their books and writings, or other matters, to preſerve them from rotting; which is alluded to by Horace: by means of which it was, that Numa's books, written on papyrus, were preſerved entire to the year 535, as we are informed by Pliny.

Solomon's temple, as well as his palace, were both of this wood. That prince gave King Hiram ſeveral cities for the cedars he had furniſhed him on theſe occaſions. Cortes is ſaid to have erected a palace at Mexico, in which were 7000 beams of cedar, moſt of them 120 feet long, and 12 in circumference, as we are informed by Herrera. Some tell us of a cedar felled in Cyprus 130 feet long, and 18 in diameter. It was uſed for the main-maſt in the galley of King Demetrius. Le Bruyn aſſures us, that the two biggeſt he ſaw on Mount Lebanon, meaſured, one of them 57 palms, and the other 47, in circumference. In the temple of Apollo at Utica, there were cedar trees near 2000 years old; which yet were nothing to that beam in an oratory of Diana at Seguntum in Spain, ſaid to have been brought thither 200 years before the deſtruction of Troy. Cedar is of ſo dry a nature, that it will not endure to be faſtened with iron nails, from which it uſually ſhrinks; ſo that they commonly faſten it with pins of the ſame wood.

"The ſtatue (ſays Hanbury) of the great goddeſs at Epheſus was made of this material; and, if this tree abounded with us in great plenty, it might have a principal ſhare in our moſt ſuperb edifices. The effluvia conſtantly emitted from its wood are ſaid to purify the air, and make rooms wholeſome. Chapels and places ſet apart for religious duties, being wainſcotted with this wood, inſpire the worſhippers with a more ſolemn awe. It is not obnoxious to worms; and emits an oil which will preſerve cloth or books from worms or corruption. The ſaw-duſt will preſerve human bodies from putrefaction; and is therefore ſaid to be plentifully uſed in the rites of embalming, where practiſed."

It is remarkable, that this tree is not to be found as a native in any other part of the world than Mount Libanus, as far as hath yet been diſcovered. What we find mentioned in Scripture of the lofty cedars can be nowiſe applicable to the common growth of this tree; ſince, from the experience we have of thoſe now growing in England, as alſo from the teſtimony of ſeveral travellers who have viſited the few remaining trees on Mount Libanus, they are not inclined to grow very lofty, but on the contrary extend their branches very far; to which the alluſion made by the Pſalmiſt agrees very well, when he is deſcribing the flouriſhing ſtate of a people, and ſays, "They ſhall ſpread their branches like the cedar tree."

Rauwolf, in his Travels, ſays, there were not at that time (i. e. anno 1574) upon Mount Libanus more than 26 trees remaining, 24 of which ſtood in a circle; and the other two, which ſtood at a ſmall diſtance, had their branches almoſt conſumed with age; nor could he find any younger trees coming up to ſucceed them, though he looked about diligently for ſome. Theſe trees (he ſays) were growing at the foot of a ſmall hill, on the top of the mountains, and amongſt the ſnow. Theſe having very large branches, commonly bend the tree to one ſide, but are extended to a great length, and in ſo delicate and pleaſant order, as if they were trimmed and made even with great diligence, by which they are eaſily diſtinguiſhed, at a great diſtance, from fir-trees. The leaves (continues he) are very like to thoſe of the larch tree, growing cloſe together in little branches upon ſmall brown ſhoots.

Maundrel, in his Travels, ſays, there were but 16 large trees remaining when he viſited the mountain, ſome of which were of a prodigious bulk, but that there were many more young ones of a ſmaller ſize. He meaſured one of the largeſt, and found it to be 12 yards ſix inches in girth, and yet ſound, and 37 yards in the ſpread of its boughs. At about five or ſix yards from the ground it was divided into five limbs, each of which was equal to a great tree. What Maundrel hath related was confirmed by a gentleman who was there in the year 1720, with this difference only, that in the dimenſions of the body of the largeſt tree, which he meaſured, and found to be 12 yards 6 inches. Now, I ſuppoſe, Mr Maundrel meant 37 yards in circumference of the ſpreading boughs, as the dimenſions of theſe, given by the traveller; yet either of them will agree with this laſt account.

12. There is another ſpecies, viz. the larch tree, which the old botaniſts ranked under Larix, with deciduous leaves, and oval obtuſe cones. It grows naturally upon the Alps and Apennines, but has been long ſince very plentifully propagated in Britain. It is of quick growth, and riſes to the height of 50 feet or more: the branches are ſlender, their ends generally hanging downward, and are garniſhed with long narrow leaves which ariſe in cluſters from one point, ſpreading open above like the hairs of a painter's bruſh: they are of a light green, and fall away in autumn. In the month of April the male flowers appear, which are diſpoſed in form of ſmall cones; the female flowers are collected into oval obtuſe cones, which in ſome ſpecies have bright purple tops, and in others they are white: theſe differences are accidental; the cones are about an inch long, obtuſe at their points, the ſcales are ſmooth, and lie over each other: under each ſcale there are generally lodged two ſeeds, which have wings. There are alſo two varieties of this tree, one of which is a native of America, and the other of Siberia. The cones of the American kind which have been brought to Britain, ſeem in general to be larger than thoſe of the common ſort.

"Many encomiums (ſays Hanbury when ſpeaking of this ſpecies) have been beſtowed on the timber of the larch: and we find ſuch a favourable account of it in ancient authors, as ſhould induce us to think it would be proper for almoſt any uſe. Evelyn recites a ſtory of Witſen, a Dutch writer, that a ſhip built of this timber and cypreſs had been found in the Numidian ſea, twelve fathoms under water, ſound and entire, and reduced to ſuch a hardneſs as to reſiſt the ſharpeſt tool, after it had lain ſubmerged above 1400 years. Certain it is, this is an excellent wood for ſhip and houſe-building. At Venice this wood is frequently uſed in building their houſes, as well as in Switzerland, where theſe trees abound; ſo that, without all doubt, the larch excels for maſts for ſhips, or beams for houſes, doors, windows, &c. particularly as it is ſaid to reſiſt the worm.

"In Switzerland (A) their houſes are covered with boards of this wood cut out a foot ſquare; and, as it emits a reſinous ſubſtance, it ſo diffuſes itſelf into every joint and crevice, and becomes ſo compact and cloſe, as well as ſo hardened by the air, as to render the covering proof againſt all weather. But as ſuch covering for houſes would cauſe great devaſtation in caſe of fire, the building

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(A) "Between Bex and Bevieux (ſays Coxe in his *Travels in Switzerland*), I obſerved the larch in great plenty. Painters, from the time of Pliny to that of Raphael, truſted their works to this wood, which the Roman naturaliſt ſtiles *immortale lignum.* The wood is reckoned excellent for all works which are to lie under water; and the borderers on the lake of Geneva prefer it for building their veſſels. In theſe parts I ſaw moſt beautiful woods of cheſnut. Haller ſays that they extend no farther. He alſo informs us, that they are found in other parts of Switzerland, and even in deſert places in ſome of the tranſalpine parts. Accident muſt have brought them thither, as it appears from Pliny that theſe trees were firſt introduced into Europe from Sardis."

buildings are confined to a limited diſtance by an order of police from the magiſtrates. The wood when firſt laid on the houſes, is ſaid to be very white; but this colour, in two or three years is changed, by means of the ſun and reſin, to a black, which appears like a ſmooth ſhining varniſh."

Of the common larch there are ſeveral varieties. The flowers which the commoneſt ſort exhibits early in the ſpring are of a delicate red colour; another ſort produces white flowers at the ſame ſeaſon, and theſe have a delightful effect among thoſe of the red ſort; whilſt another, called the *Black Newfoundland larix*, increaſes the variety, though by an aſpect little differing from the others. There are alſo larches with greeniſh flowers, pale red, &c. all of which are accidental varieties from ſeeds. Theſe varieties are eaſily diſtinguiſhed, even when out of blow: the young ſhoots of the white-flowering larch are of the lighteſt green, and the cones when ripe are nearly white. The red flowering larch has its ſhoots of a reddiſh caſt, and the cones are of a brown colour; whilſt the cones and ſhoots of the black Newfoundland larch are in the ſame manner proportionally tinged. The cones, which are a very great ornament to ſeveral ſorts of the pines, are very little to theſe. Their chief beauty conſiſts in the manner of their growth, the nature and beauty of their pencilled leaves and fair flowers; for the cones that ſucceed them are ſmall, of a whitiſh, a reddiſh, or a blackiſh-brown colour, and make no figure.

The pinus cedrus and pinus larix are propagated by ſowing in March on a bed of light earth expoſed to the morning ſun. The ſeed muſt be covered half an inch thick with fine light earth, and the beds watered at times when the weather is dry. In about ſix weeks the plants will appear; they muſt at this time be carefully guarded from the birds, ſhaded from the ſun and winds, and kept very clear of weeds. In the latter end of April the following year, they may be removed into beds of freſh earth, placing them at ten inches diſtance every way. They are to be kept here two years, and ſuch of them as ſeem to bend muſt be tied up to a ſtake to keep them upright. They may afterwards be planted in the places where they are to remain. They thrive well on the ſides of barren hills, and make a very pretty figure there.

Reſpecting the uſes of this tree, Dr Pallas, in his *Flora Roſſica*, informs us, that if it is burnt, and the wood conſumed, the internal part of the wood diſtils copiouſly a drying reddiſh gum, a little leſs glutinous than gum arabic, ſomewhat of a reſinous taſte, but wholly ſoluble in water. At the inſtigation of M. Kinder, this gum has lately been ſold in the Ruſſian ſhops under the name of *gummi Orenburgenſis*, but which our author thinks ſhould be called *gummi Uralienſe* or *laricis*. It is eaten by the Woguli as a dainty, and is ſaid to be nutritious and antiſcorbutic. Some manna was gathered from the green leaves, but it could never be condenſed. The Ruſſians uſe the boletus laricinus as an emetic in intermittents, and to check the leucorrhœa. At Baſchir and Siberia the inhabitants ſprinkle the dry powder on the wounds of oxen and horſes, as a detergent and anthelmintic. The nuts of the pinus cembra, the ſame author aſſerts, are eaten as luxuries in Ruſſia, and are even exported with the ſame view. The unripe cones give a very fragrant oil, termed balſamic. The inhabitants of Siberia uſe the tender tops, and even the bark rubbed off in the ſpring, as an antiſcorbutic. The kernels of the nuts of the amygdalus nana give a very pleaſing flavour to brandy; and, when preſſed, afford a bitter oil in large quantities. The way of deſtroying the bitter is by digeſting it in the ſun with ſpirit of wine, and it then becomes ſweet and extremely agreeable.

From the larch-tree is extracted what is erroneouſly called *Venice turpentine*. This ſubſtance, or natural balſam, flows at firſt without inciſion; when it has done dropping, the poor people who wait in the fir woods make inciſions at about two or three feet from the ground into the trunks of the trees, into which they fix narrow troughs about 20 inches long. The end of theſe troughs is hollowed like a ladle; and in the middle is a ſmall hole bored for the turpentine to run into the receiver which is placed below it. As the gummy ſubſtance runs from the trees, it paſſes along the ſloping gutter or trough to the ladle, and from thence runs through the holes into the receiver. The people who gather it viſit the trees morning and evening from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, Venice turpentine is clear like water, and of a yellowiſh white; but, as it grows older, it thickens and becomes of a citron colour. It is procured in the greateſt abundance in the neighbourhood of Lyons, and in the valley of St Martin near St Lucern in Switzerland.

Though we have already noticed the manner of cultivating ſome of the particular ſpecies of this genus, and have alſo remarked the uſes of ſome of them, we ſhall finiſh the article with a few general obſervations on the culture and uſes of the whole.

Culture. All the ſorts of pines are propagated by ſeeds produced in hard woody cones. The way to get the ſeeds out of theſe cones is to lay them before a gentle fire, which will cauſe the cells to open, and then the ſeeds may be eaſily taken out. If the cones are kept entire, the ſeeds will remain good for ſome years; ſo that the ſureſt way of preſerving them is to let them remain in the cones till the time for ſowing the ſeeds. If the cones are kept in a warm place in ſummer, they will open and emit the ſeeds; but if they are not expoſed to the heat, they will remain cloſe for a long time. The beſt ſeaſon for ſowing the pines is about the end of March. When the ſeeds are ſown, the place ſhould be covered with nets to keep off the birds; otherwiſe, when the plants begin to appear with the huſk of the ſeed on the top of them, the birds will peck off the tops, and thus deſtroy them.

Uſes. From the firſt ſpecies is extracted the common turpentine, much uſed by farriers, and from which is drawn the oil of that name. The proceſs of making pitch, tar, reſin, and turpentine, from theſe trees, is very familiar. In the ſpring time, when the ſap is moſt free in running, they pare off the bark of the pine tree, to make the ſap run down into a hole which they cut at the bottom to receive it. In the way, as it runs down, it leaves a white matter like cream, but a little thicker. This is very different from all the kinds of reſin and turpentine in uſe, and it is generally ſold to be uſed in the making of flambeaux inſtead of white bees wax. The matter that is received in the hole at the bottom is taken up with ladles, and put in a large baſket. A great part of this immediately runs through, and this is the common

mon turpentine. This is received into ſtone or earthen pots, and is ready for ſale. The thicker matter, which remains in the baſket, they put into a common alembic, adding a large quantity of water. They diſtil this as long as any oil is ſeen ſwimming upon the water. This oil they ſeparate from the ſurface in large quantities, and this is the common oil or ſpirit of turpentine. The remaining matter at the bottom of the ſtill is common yellow reſin. When they have thus obtained all that they can from the ſap of the tree, they cut it down, and hewing the wood into billets, they fill a pit dug in the earth with theſe billets, and, ſetting them on fire, there runs from them, while they are burning, a black thick matter. This naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil. If this hole be made too large, it ſets the whole quantity of the tar on fire; but, if ſmall enough, it runs quietly out.

The tar, being thus made, is put up in barrels; and if it be to be made into pitch, they put it into large boiling veſſels, without adding any thing to it. It is then ſuffered to boil a while, and being then let out, is found when cold to be what we call pitch.

A decoction of the nuts or ſeeds of the firſt ſpecies in milk, or of the extremities of the branches pulled in ſpring, is ſaid, with a proper regimen, to cure the moſt inveterate ſcurvy. The wood of this ſpecies is not valued; but that of the Scots pine is ſuperior to any of the reſt. It is obſervable of the Scots pine, that when planted in bogs, or in a moiſt ſoil, though the plants make great progreſs, yet the wood is white, ſoft, and little eſteemed; but when planted in a dry ſoil, though the growth of the trees is there very ſlow, yet the wood is proportionably better. Few trees have been applied to more uſes than this. The talleſt and ſtraigheſt are formed by nature for maſts to our navy. The timber is reſinous, durable, and applicable to numberleſs domeſtic purpoſes, ſuch as flooring and wainſcotting of rooms, making of beds, cheſts, tables, boxes, &c. From the trunk and branches of this, as well as moſt others of the pine tribe, tar and pitch is obtained. By inciſion, barras, Burgundy pitch, and turpentine, are acquired and prepared. The reſinous roots are dug out of the ground in many parts of the Highlands, and, being divided into ſmall ſplinters, are uſed by the inhabitants to burn, inſtead of candles.——At Loch-Broom, in Roſs-ſhire the fiſhermen make ropes of the inner bark; but hard neceſſity has taught the inhabitants of Sweden, Lapland, and Kamtſchatka, to convert the ſame into bread. To effect this, they, in the ſpring ſeaſon, make choice of the talleſt and faireſt trees; then ſtripping off carefully the outer bark, they collect the ſoft, white, ſucculent interior bark, and dry it in the ſhade. When they have occaſion to uſe it, they firſt toaſt it at the fire, then grind, and after ſteeping the flour in warm water to take off the reſinous taſte, they make it into thin cakes, which are baked for uſe. On this ſtrange food the poor inhabitants are ſometimes conſtrained to live for a whole year; and, we are told, through cuſtom, become at laſt even fond of it. Linnæus remarks, that this ſame bark-bread will fatten ſwine; and humanity obliges us to wiſh, that men might never be reduced to the neceſſity of robbing them of ſuch a food. The interior bark, of which the above-mentioned bread is made, the Swediſh boys frequently peel off the trees in the ſpring, and eat raw with greedy appetite. From the cones of this tree is prepared a diuretic oil, like the oil of turpentine, and a reſinous extract, which has ſimilar virtues with the balſam of Peru. An infuſion or tea of the buds is highly commended as an antiſcorbutic. The farina, or yellow powder, of the male-flowers, is ſometimes in the ſpring carried away by the winds, in ſuch quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimſtone. The tree lives to a great age; Linnæus affirms to 400 years.

PIONEERS, in the art of war, are ſuch as are commanded in from the country, to march with an army for mending the ways, for working on intrenchments and fortifications, and for making mines and approaches. The ſoldiers are likewiſe employed for all theſe purpoſes. Moſt of the foreign regiments of artillery have half a company of pioneers, well inſtructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, ſaws, ſpades, and pick-axes. Each pioneer muſt have an axe, a ſaw, and an apron; a cap with a leather crown, and a black bears-ſkin front, on which is to be the king's creſt in white, on a red ground; and the number of the regiment is to be on the back part of it.

PIP, or PEP, a diſeaſe among poultry, conſiſting of a white thin ſkin, or film, that grows under the tip of the tongue, and hinders their feeding. It uſually ariſes from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with ſalt. Hawks are particularly liable to this diſeaſe, eſpecially from feeding on ſtinking fleſh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are uſually of lead, iron, earth, or wood: the latter are uſually made of oak or elder. Thoſe of iron are caſt in forges; their uſual length is about two feet and a half: ſeveral of theſe are commonly faſtened together by means of four ſcrews at each end, with leather or old hat between them, to ſtop the water. Thoſe of earth are made by the potters; theſe are fitted into one another, one end being always made wider than the other. To join them the cloſer, and prevent their breaking, they are covered with tow and pitch: their length is uſually about that of the iron pipes. The wooden pipes are trees bored with large iron augres, of different ſizes, beginning with a leſs, and then proceeding with a larger ſucceſſively; the firſt being pointed, the reſt being formed like ſpoons, increaſing in diameter, from one to ſix inches or more: they are fitted into the extremities of each other (as repreſented fig. 2.), and are ſold by the foot.

Wooden pipes are bored as follows. The machine repreſented fig. 1. is put in motion by the wheel A, which is moved by a current of water; upon the axle of this wheel is a cog-wheel B, which cauſes the lanterns C, D, to turn horizontally, whoſe common axis is conſequently in a perpendicular direction. The lantern D turns at the ſame time two cog-wheels, E and F: the firſt, E, which is vertical, turns the augre which bores the wood; and the ſecond, F, which is horizontal, cauſes the carriage bearing the piece to advance by means of the arms H, I, which take hold of the [illegible]

[illegible]

ches in the wheel K. The firſt, H, by means of the notches, draws the wheel towards F; and the other, I, puſhes the under-poſt of the wheel in an oppoſite direction; both which motions tend to draw the carriage towards F, and conſequently cauſe the augre to pierce the wood. The augre being from 9 to 12 feet in length, and of a proportionable bigneſs, it will be neceſſary to have two pieces, as L, L, to ſupport its weight, and cauſe it to enter the piece to be bored with the ſame uniformity.

For the conſtruction of leaden pipes, ſee the article PLUMBERY.

*Air-*PIPES. See *AIR-Pipes*.

PIPES *of an Organ*. See ORGAN.

Bag PIPE. See BAG *Pipe*.

*Horn-*PIPE. See HORNPIPE.

Tobacco-PIPE, a machine uſed in the ſmoking of tobacco, conſiſting of a long tube, made of earth or clay, having at one end a little caſe, or furnace, called the *bowl*, for the reception of the tobacco, the fumes whereof are drawn by the mouth through the other end. Tobacco pipes are made of various faſhions: long, ſhort, plain, worked, white, varniſhed, unvarniſhed, and of various colours, &c. The Turks uſe pipes three or four feet long, made of ruſhes, or of wood bored, at the end whereof they fix a kind of a pot of baked earth, which ſerves as a bowl, and which they take off after ſmoking.

PIPE, alſo denotes a veſſel or meaſure for wine, and things meaſured by wine-meaſure. See BARREL and MEASURE.

PIPE, in *Mining*, is where the ore runs forwards endwiſe in a hole, and doth not ſink downwards or in a vein.

PIPE, *Pipa*, in *Law*, is a roll in the exchequer, called alſo the *great roll*. See the next article.

PIPE-Office, is an office wherein a perſon called the *clerk of the pipe*, makes out leaſes of crown-lands, by warrant from the lord-treaſurer, or commiſſioners of the treaſury, or chancellor of the exchequer. The clerk of the pipe makes out alſo all accounts of ſheriffs, &c. and gives the accountants their *quietus eſt*. To this office are brought all accounts which paſs the remembrancer's office, and remain there, that if any ſtated debt be due from any perſon, the ſame may be drawn down into the great roll of the pipe: upon which the comptroller iſſues out a writ, called the *ſummons of the pipe*, for recovery thereof; and if there be no goods or chattels, the clerk then draws down the debts to the lord treaſurer's remembrancer, to write eſtreats againſt their lands. All tallies which vouch the payment of any ſum contained in ſuch accounts are examined and allowed by the chief ſecondary of the pipe. Beſides the chief clerk in this office, there are eight attorneys or ſworn clerks, and a comptroller.

Pipe-Fiſh. See SYNGNATHUS, ICHTHYOLOGY *Index*.

Sea PIPES, the trivial name of univalve ſhells belonging to the genus *dentalis*. See CONCHOLOGY *Index*.

PIPER, a ſpecies of fiſh. See TRIGLA, ICHTHYOLOGY *Index*.

PIPER, *Pepper*; a genus of plants belonging to the diandria claſs. See BOTANY *Index*. There are 20 ſpecies, of which the moſt remarkable is the ſiriboa, with oval, heart ſhaped, nerved leaves, and reflexed ſpikes. This is the plant which produces the pepper ſo much uſed in food. It is a ſhrub whoſe root is ſmall, fibrous, and flexible; it riſes into a ſtem, which requires a tree or prop to ſupport it. Its wood has the ſame ſort of knots as the vine; and when it is dry, it exactly reſembles the vine-branch. The leaves, which have a ſtrong ſmell and a pungent taſte, are of an oval ſhape; but they diminiſh towards the extremity, and terminate in a point. From the flower-buds, which are white, and are ſometimes placed in the middle and ſometimes at the extremity of the branches, are produced ſmall berries reſembling thoſe of the currant tree. Each of theſe contains between 20 and 30 corns of pepper; they are commonly gathered in October, and expoſed to the ſun ſeven or eight days. The fruit which was green at firſt, and afterwards red, when ſtripped of its covering aſſumes the appearance it has when we ſee it. The largeſt, heavieſt, and leaſt ſhrivelled, is the beſt.

The pepper plants flouriſhes in the iſland of Java, Sumatra (A), and Ceylon, and more particularly on the Malabar coaſt. It is not ſown, but planted; and great nicety is required in the choice of the ſhoots. It produces no fruit till the end of three years; but bears ſo plentifully the three ſucceeding years, that ſome plants yield between ſix and ſeven pounds of pepper. The bark then begins to ſhrink; and the ſhrub declines ſo faſt, that in 12 years time it ceaſes bearing.

The culture of pepper is not difficult: it is ſufficient to plant it in a rich ſoil, and carefully to pull up the weeds that grow in great abundance round its roots, eſpecially the three firſt years. As the ſun is highly neceſſary to the growth of the pepper plant, when it is ready to bear, the trees that ſupport it muſt be lopped to prevent their ſhade from injuring the fruit. When the ſeaſon is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit.

The pepper exported from Malabar, which was formerly entirely in the hands of the Portugueſe, and was afterwards divided between the Dutch, Britiſh, and French, amounted to about 10,000,000 weight. Betel, or betle, is a ſpecies of this genus. See BETEL. It is a creeping and climbing plant like the ivy; and its leaves a good deal reſemble thoſe of the citron, though they are longer and narrower at the extremity. It grows in all parts of India, but thrives beſt in moiſt places. The natives cultivate it as we do the vine, placing props for it to run and climb upon; and it is a common practice to plant it againſt the tree which bears the areca-nut.

At all times of the day, and even in the night, the Indians chew the leaves of the betel, the bitterneſs of which is corrected by the areca that is wrapped up in them. There is conſtantly mixed with it the chinam, a

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(A) See a copious account of the mode of cultivating pepper in Sumatra, in Mr Marſden's *Hiſtory of Sumatra*, or in the *New Annual Regiſter* for 1783, p. 147.

a kind of burnt lime made of ſhells. The rich frequently add perfumes, either to gratify their vanity or their ſenſuality.

It would be thought a breach of politeneſs among the Indians to take leave for any long time, without preſenting each other with a purſe of betel. It is a pledge of friendſhip that relieves the pain of abſence. No one dares to ſpeak to a ſuperior unleſs his mouth is perfumed with betel; it would even be rude to neglect this precaution with an equal. The women of gallantry are the moſt laviſh in the uſe of betel, as being a powerful incentive to love. Betel is taken after meals; it is chewed during a viſit; it is offered when you meet, and when you ſeparate; in ſhort, nothing is to be done without betel. If it is prejudicial to the teeth, it aſſiſts and ſtrengthens the ſtomach. At leaſt, it is a general faſhion that prevails throughout India.

London Medical Journal, vol v. part i. p. 270 &c.

The *piper amalago*, or black pepper, and the *piper inequale*, or long pepper of Jamaica, with ſome other ſpecies, are indigenous, and known by the names of *joint wood*, or *peppery elders*. The firſt bears a ſmall ſpike, on which are attached a number of ſmall ſeeds of the ſize of muſtard. The whole of the plant has the exact taſte of the Eaſt India black pepper. The long pepper buſh grows taller than the amalago. The leaves are broad, ſmooth, and ſhining. The fruit is ſimilar to the long pepper of the ſhops, but ſmaller. The common people in Jamaica ſeaſon their meſſes with the black pepper. To preſerve both, the fruit may be ſlightly ſcalded when green, then dried, and wrapped in paper. Perhaps hereafter they may be deemed worthy of attention.

PIPRA, a genus of birds, of the order of *paſſeres*. See ORNITHOLOGY *Index*.

PIQUET, or **PICKET**, a celebrated game at cards, much in uſe throughout the polite world.

It is played between two perſons, with only 32 cards; all the duces, threes, fours, fives, and ſixes, being ſet aſide.

In reckoning at this game, every card goes for the number it bears, as a ten for ten; only all count cards go for ten, and the ace for eleven: and the uſual game is one hundred up. In playing, the ace wins the king, the king the queen, and ſo down.

Twelve cards are dealt round, uſually by two and two; which done, the remainder are laid in the middle: if one of the gameſters finds he has not a court card in his hand, he is to declare he has *carte-blanche*, and tell how many cards he will lay out, and deſire the other to diſcard, that he may ſhow his game, and ſatisfy his antagoniſt that the carte-blanche is real; for which he reckons ten.

Each perſon diſcards, i. e. lays aſide a certain number of his cards, and takes in a like number from the ſtock. The firſt of the eight cards may take three, four, or five; the dealer all the remainder, if he pleaſes.

After diſcarding, the eldeſt hand examines what ſuit he has moſt cards of; and reckoning how many points he has in that ſuit, if the other have not ſo many in that or any other ſuit, he tells one for every ten of that ſuit. He who thus reckons moſt is ſaid to win the point.

The point being over, each examines what *ſequences* he has of the ſame ſuit, viz. how many tierces, or ſequences of threes, quartes or fours, quintes or fives, ſixiemes, or ſixes, &c. For a tierce they reckon three points, for a quarte four, for a quinte 15, for a ſixieme 16, &c. And the ſeveral ſequences are diſtinguiſhed in dignity by the cards they begin from: thus ace king, and queen, are called *tierce major*, king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the beſt tierce, quarte, or quinte, i. e. that which takes its deſcent from the beſt card, prevails, ſo as to make all the others in that hand good, and deſtroy all thoſe in the other hand. In like manner, a quarte in one hand ſets aſide a tierce in the other.

The ſequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three of any ſort, three: but here too, as in ſequences, he that with the ſame number of threes has one that is higher than any the other has, e. gr. three aces, has all his others made good hereby, and his adverſary's all ſet aſide. But four of any ſort, which is called a *quatorze*, always ſets aſide three.

All the game in hand being thus reckoned, the eldeſt proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the ſuit; and the higheſt card of the ſuit wins the trick. Note, unleſs a trick be won with a card above a nine (except the laſt trick), nothing is reckoned for it, though the trick ſerves afterwards towards winning the cards; and that he who plays laſt does not reckon for his cards unleſs he wins the trick.

The cards being played out, he that has moſt tricks reckons ten for winning the cards. If they have tricks alike, neither reckons any thing. The deal being finiſhed, and each having marked up his game, they proceed to deal again as before, cutting afreſh each time for the deal.

If both parties be within a few points of being up, the carte-blanche is the firſt thing that reckons, then the point, then the ſequences, then the quatorzes or threes, then the tenth cards.

He that can reckon 30 in hand by carte-blanche, points, quintes, &c. without playing, before the other has reckoned any thing, reckons 90 for them; and this is called a *repique*. If he reckons above 30, he reckons ſo many above 90. If he can make up 30, part in hand and part play, ere the other has told any thing, he reckons for them 60. And this is called a *pique*. Whence the name of the game. He that wins all the tricks, inſtead of ten, which is his right for winning the cards, reckons 40. And this is called a *capot*.

Mr de Moivre, who has made this game the object of mathematical inveſtigation, has propoſed and ſolved the following problems: 1. To find at piquet the probability which the dealer has for taking one ace or more in three cards, he having none in his hand. He concludes from his computation, that it is 29 to 28 that the dealer takes one ace or more. 2. To find at piquet the probability which the eldeſt has of taking an ace or more in five cards, he having no ace in his hand. Anſwer: 232 to 91, or 5 to 2, nearly. 3. To find at piquet the probability which the eldeſt hand has of taking an ace and a king in five cards, he having none in his hand. Anſwer; the odds againſt the eldeſt hand taking an ace and a king are 331 to 315, or 21 to 20 nearly. 4. To find at piquet the probability of having 12 cards dealt to, without king, queen, or knaves, which caſe is commonly called *cartes-blanches*. Anſwer: the odds againſt cartes-blanches are 1791 to 1 nearly. 5. To find how many different ſets, eſſentially different from one another, one may have at piquet before taking in. Anſwer; 28,967,278. This number falls ſhort of the ſum of all the diſtinct combinations, whereby 12 cards may be taken out of 32, this number being 225,792,840; but it muſt be conſidered that in that number ſeveral ſets of the ſame import, but differing in ſuit, might be taken, which would not introduce an eſſential difference among the ſets. The ſame author gives alſo ſome obſervations on this game, which he had from an experienced player. See *Doctrine of Chances*, p. 179, &c. M. de Monmort has treated of piquet in his *Analyſe des Jeux de Hazard*, p. 162.

PIRA, is a name by which a variety of foreign fiſhes are diſtinguiſhed. The *pira-aca* is a little horned fiſh of the Weſt Indies, called by Cluſius and others the *monoceros* or *unicorn-fiſh*. The *pira acangata* is the name of a Braſilian fiſh, which reſembles the perch both in ſize and ſhape. It ſeldom exceeds four or five inches in length; its mouth is ſmall; its tail forked. On the back it has only one long fin, which is ſupported by rigid and prickly ſpines. This fin it can depreſs at pleaſure, and ſink within a cavity made for it in the back. Its ſcales are of a ſilvery white colour; it is wholeſome and well taſted. *Pira bebe* is the name of the milvus, or kite-fiſh. *Pira-coaba* is an American fiſh of the truttaceous kind, of a very delicate flavour. It grows to the length of 12 inches; its noſe is pointed, and its mouth large, but without teeth; the upper jaw is longer than the under one, and hangs over like a cartilaginous prominence; its eyes are very large, and its tail is forked; under each of the gill fins there is a beard made of ſix white filaments, and covered with ſilvery ſcales. *Pira jurumenbeca* is a Braſilian fiſh, otherwiſe called *bocca molle*. It lives in the muddy bottom of the American ſeas, and is a long-bodied not flatted fiſh. It grows to a great ſize, being found nine, and ſometimes even ten or eleven, feet long, and two feet and a half thick. It has one long fin on the back, the anterior part of which is thin and pellucid. There is alſo a cavity on the back, as in the pira acangata, into which the fin can be depreſſed at pleaſure; the tail is not forked, and the ſcales are all of a ſilvery colour and brightneſs. The fiſh is very well taſted; the *pira-pixanga* is another Braſilian fiſh of the turdus or wraſſe kind, and called by ſome the *gutviſch*. It is generally about four or five inches long; its mouth is pretty large, and furniſhed with very ſmall and very ſharp teeth; its head is ſmall, but its eyes are large and prominent, the pupil being of a fine turquoiſe colour, and the iris yellow and red in a variety of ſhades. The coverings of the gills end in a triangular figure, and are terminated by a ſhort ſpine or prickle; its ſcales are very ſmall, and ſo evenly arranged, and cloſely laid on the fleſh, that it is very ſmooth to the touch; its tail is rounded at the end; its whole body, head, tail, and fins, are of a pale yellow colour, variegated all over with very beautiful blood-coloured ſpots; theſe are round, and of the bigneſs of hemp-ſeed on the back and ſides, and ſomething larger on the belly; the fins are all ſpotted in the ſame manner, and are all marked with an edge of red. It is caught among the rocks, and about the ſhores, and is a very well taſted fiſh. *Piranha* is an American fiſh, more generally known by the name *piraya*. *Piraquiba*, or *ipiraquiba*, is the name of a fiſh originally Braſilian, which ſome writers apply to the *remora* or *ſucking fiſh*.

PIRÆUS PORTUS, in *Ancient Geography*, a celebrated port to the weſt of Athens, conſiſting naturally of three harbours or baſons, (Thucydides); which lay neglected, till Themiſtocles put the Athenians on making it a commodious port, (Nepos); the Phalerus, a ſmall port, and not far from the city, being what they uſed before that time, (Pauſanias, Nepos). Piræus was originally a village of Attica, (Pauſanias); an iſland, (Strabo); and though diſtant 40 ſtadia from Athens, was joined to it by two long walls, (Thucydides), and itſelf locked or walled round, (Nepos): A very commodious and ſafe harbour. The whole of its compaſs was 60 ſtadia, including the Munichia. Not far from the Piræus ſtood the ſepulchre of Themiſtocles; whither his friends conveyed his bones from Magneſia, into the Hither Aſia, (Cicero, Plutarch, Pauſanias). The entrance of the Piræus is narrow, and formed by two rocky points, one belonging to the promontory of Eetion, the other to that of Alcimus. Within were three ſtations for ſhipping; Kantharus, ſo named from a hero; Aphrodiſium, from a temple of Venus; and Zea, the reſort of veſſels laden with grain. By it was a demos or borough town of the ſame name before the time of Themiſtocles, who recommended the exchanging its triple harbour for the ſingle one of Phalerum, both as more capacious and as better ſituated for navigators. The wall was begun by him when archon, in the ſecond year of the 75th Olympiad, 477 years before Chriſt; and afterwards he urged the Athenians to complete it as the importance of the place deſerved. This whole fortification was of hewn ſtone, without cement or other material, except lead and iron, which were uſed to hold together the exterior ranges or facings. It was ſo wide that loaded carts could paſs on it in different directions, and it was 40 cubits high, which was about half what he had deſigned.

Chandler's Travels in Greece, p. 19. &c.

The Piræus, as Athens flouriſhed, became the common emporium of all Greece. Hippodamus an architect, celebrated, beſides other monuments of his genius, as the inventor of many improvements in houſe-building, was employed to lay out the ground. Five porticoes, which uniting formed the *Long Portico*, were erected by the ports. Here was an *agora* or market-place, and, farther from the ſea, another called *Hippodamia*. By the veſſels were dwellings for the mariners. A theatre was opened, temples were raiſed, and the Piræus, which ſurpaſſed the city in utility, began to equal it in dignity. The cavities and windings of Munichia, natural and artificial, were filled with houſes; and the whole ſettlement, comprehending Phalerum and the ports of the Piræus, with the arſenals, the ſtorehouſes, the famous armoury of which Philo was the architect, and the ſheds for 300, and afterwards 400, triremes, reſembled the city of Rhodes, which had been planned by the ſame Hippodamus. The ports, on the commencement of the

Piræus, Piracy.

Peloponneſian war, were ſecured with chains. Centinels were ſtationed, and the Piræus was carefully guarded.

The Piræus was reduced with great difficulty by Sylla, who demoliſhed the walls, and ſet fire to the armoury and arſenals. In the civil war it was in a defenceleſs condition. Calenus, lieutenant to Cæſar, ſeized it, inveſted Athens, and ravaged the territory. Strabo, who lived under the emperors Auguſtus and Tiberius, obſerves, that the many wars had deſtroyed the long walls, with the fortreſs of Munychia, and had contracted the Piræus into a ſmall ſettlement by the ports and the temple of Jupiter Saviour. This fabric was then adorned with wonderful pictures, the works of illuſtrious artiſts, and on the outſide with ſtatues. In the ſecond century, beſides houſes for triremes, the temple of Jupiter and Minerva remained, with their images in braſs, and a temple of Venus, a portico, and the tomb of Themiſtocles.

The port of the Piræus has been named *Porto Lione*, from the marble lion ſeen in the chart, and alſo *Porto Dracco*. The lion has been deſcribed as a piece of admirable ſculpture, 10 feet high, and as repoſing on its hinder parts. It was pierced, and, as ſome have conjectured, had belonged to a fountain. Near Athens, in the way to Eleuſis, was another, the poſture couchant; probably its companion. Both theſe were removed to Venice by the famous general Moroſini, and are to be ſeen there before the arſenal. At the mouth of the port are two ruined piers. A few veſſels, moſtly ſmall craft, frequent it. Some low land at the head ſeems an incroachment on the water. The buildings are a mean cuſtomhouſe, with a few ſheds; and by the ſhore on the eaſt ſide, a warehouſe belonging to the French; and a Greek monaſtery dedicated to St Spiridion. On the oppoſite ſide is a rocky ridge, on which are remnants of the ancient wall, and of a gateway towards Athens. By the water-edge are veſtiges of building; and going from the cuſtomhouſe to the city on the right hand, traces of a ſmall theatre in the ſide of the hill of Munychia.

PIRACY, the crime of robbery and depredation upon the high ſeas.

By the ancient common law, piracy, if committed by a ſubject, was held to be a ſpecies of treaſon, being contrary to his natural allegiance; and by an alien, to be felony only: but now, ſince the ſtatute of treaſons, 25 Edw. III. c. 2. it is held to be only felony in a ſubject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law. But, it being inconſiſtent with the liberties of the nation, that any man's life ſhould be taken away, unleſs by the judgement of his peers, or the common law of the land, the ſtatute 28 Hen. VIII. c. 15. eſtabliſhed a new juriſdiction for this purpoſe; which proceeds according to the courſe of the common law.

The offence of piracy, by common law, conſiſts in committing thoſe acts of robbery and depredation upon the high ſeas, which, if committed upon land, would have amounted to felony there. But, by ſtatute, ſome other offences are made piracy alſo: as, by ſtatute 11 and 12 W. III. c. 7. if any natural-born ſubject commits any act of hoſtility upon the high ſeas, againſt others of his majeſty's ſubjects, under colour of a commiſſion from any foreign power; this, though it would only be an act of war in an alien, ſhall be conſtrued piracy, in a ſubject. And farther, any commander, or other ſeafaring perſon, betraying his truſt, and running away with any ſhip, boat, ordnance, ammunition, or goods; or yielding them up voluntarily to a pirate; or conſpiring to do theſe acts; or any perſon aſſaulting the commander of a veſſel, to hinder him from fighting in defence of his ſhip; or confining him, or cauſing or endeavouring to cauſe a revolt on board; ſhall, for each of theſe offences, be adjudged a pirate, felon, and robber, and ſhall ſuffer death, whether he be principal, or merely acceſſory by ſetting forth ſuch pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. And the ſtatute 4 Geo. I. c. 11. expreſsly excludes the principals from the benefit of clergy. By the ſtatute 8 Geo. I. c. 24. the trading with known pirates, or furniſhing them with ammunition, or fitting out any veſſel for that purpoſe, or in any wiſe conſulting, combining, confederating, or correſponding with them; or the forcibly boarding any merchant veſſel, though without ſeizing or carrying her off, and deſtroying or throwing any of the goods overboard; ſhall be deemed piracy: and ſuch acceſſories to piracy as are deſcribed by the ſtatute of King William are declared to be principal pirates; and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the ſame ſtatutes alſo, (to encourage the defence of merchant veſſels againſt pirates), the commanders or ſeamen wounded, and the widows of ſuch ſeamen as are ſlain, in any piratical engagement, ſhall be entitled to a bounty to be divided among them, not exceeding one-fiftieth part of the value of the cargo on board: and ſuch wounded ſeamen ſhall be intitled to the penſion of Greenwich hoſpital; which no other ſeamen are, except only ſuch as have ſerved in a ſhip of war. And if the commander ſhall behave cowardly, by not defending the ſhip, if ſhe carry guns or arms; or ſhall diſcharge the mariners from fighting, ſo that the ſhip falls into the hands of pirates; ſuch commander ſhall forfeit all his wages, and ſuffer ſix months impriſonment. Laſtly, by ſtatute 18 Geo. II. c. 30. any natural-born ſubject or denizen, who in time of war ſhall commit hoſtilities at ſea againſt any of his fellow-ſubjects, or ſhall aſſiſt an enemy on that element, is liable to be tried and convicted as a pirate.

Piracy, Pirate.

PIRATE, (πειρατης, Gr.); a ſea-robber, or an armed ſhip that roams the ſeas without any legal commiſſion, and ſeizes or plunders every veſſel ſhe meets indiſcriminately, whether friends or enemies.

The colours uſually diſplayed by pirates are ſaid to be a black field, with a death's head, a battle-axe, and hour-glaſs. The laſt inſtrument is generally ſuppoſed to determine the time allowed to the priſoners, whom they take, to conſider whether they will join the pirates in their felonious combination, or be put to death, which is often perpetrated in the moſt cruel manner.

Among the moſt celebrated pirates of the north is recorded Alvilda, daughter of a king of the Goths named *Sywardus*. She embraced this occupation to deliver herſelf from the violence impoſed on her inclination, by a marriage with Alf, ſon of Sigarus king of Denmark. She dreſſed herſelf as a man; and commanded her ſelected rowers, and the reſt of her crew, of a number of young women attired in the ſame manner. Among the firſt of her cruizes, ſhe touched at a place where a company of pirates bewailed the death of their captain. The ſtrangers were captivated with the agreeable manners of Alvilda, and choſe her for their chief. By this reinforcement ſhe became ſo formidable upon the ſea, that Prince Alf came to engage her. She ſuſtained his attacks for a conſiderable time: but, in a vigorous action, Alf boarded her veſſel, and having killed the greateſt part of her crew, ſeized the captain, namely herſelf; whom nevertheleſs he knew not, becauſe the princeſs had a caſque which covered her viſage. Being maſter of her perſon, he removed the caſque; and in ſpite of her diſguiſe, inſtantly recognized her, and offered her his hand in wedlock.

PIRENE, (Pliny); a fountain ſacred to the muſes, ſpringing below the top of the Acrocorinthus, a high and ſteep mountain which hangs over Corinth. Its waters were agreeable to drink, (Pauſanias); extremely clear, (Strabo); very light, (Athenæus); and pale, (Perſius): having relation either to the grief of Pirene, mother of Cenchrea, from whoſe tears this fountain aroſe, (Pauſanias); or to the paleneſs brought on by the too eager purſuits of the muſes.

PIROMALLI, Paul, a dominican of Calabria, was ſent a miſſionary into the eaſt. He remained a long time in Armenia, where he had the happineſs to bring back to the church many ſchiſmatics and Eutycheans, and the patriarch himſelf, who had before thrown every obſtacle in his way. He afterwards paſſed into Georgia and Perſia, then into Poland, in quality of Pope Urban VIII.'s nuncio, in order to appeaſe the diſturbances which had been occaſioned there by the diſputes of the Armenians, who were very numerous in that country. Piromalli reunited them in the profeſſion of the ſame faith, and obſervance of the ſame ceremonies. In his return to Italy, he was taken by ſome corſairs who carried him priſoner to Tunis. As ſoon as he was ranſomed, he went to Rome, and gave an account of his miſſion to the pope, who conferred upon him ſome ſignal marks of his eſteem. His holineſs entruſted him with the reviſal of an Armenian Bible, and ſent him again into the eaſt, where he was promoted, in 1655, to the biſhopric of Naſſivan. After having governed that church for nine years, he returned to Italy, and took the charge of the church of Baſignano, where he died three years after in 1667. His charity, his zeal, and other virtues, did honour to the Epiſcopal office. There are extant of his writings, 1. Some works of Controverſy and Theology. 2. Two Dictionaries; the one a Latin-Perſian, and the other an Armenian-Latin. 3. An Armenian Grammar. 4. A Directory, which is of great uſe in correcting Armenian books. All theſe works equally diſtinguiſh him for virtue and for learning.

PIRON, Alexis, a French poet, was born at Dijon in July 1689, where his father was an apothecary, and where he paſſed more than 30 years in idle and deſtructive diſſipation. He was at length obliged to quit the place of his nativity, in order to avoid the reproaches of his fellow citizens, on account of an ode which he had written, and which gave great offence. His relations not being able to give him much aſſiſtance, he ſupported himſelf at Paris by means of his pen, the ſtrokes of which were as beautiful and fair as thoſe of an engraver. He lived in the houſe of M. de Belliſle as his ſecretary, and afterwards with a financier, who did not know that he had a man of genius under his roof. His reputation as a writer commenced with ſome pieces which he publiſhed for the entertainment of the populace, and which ſhowed ſtrong marks of original invention; but what fully eſtabliſhed his character in this way was his comedy intitled *Metromany*, which was the beſt that had appeared in France ſince Regnard's Gameſter. This performance, in five acts, well conducted, replete with genius, wit, and humour, was acted with the greateſt ſucceſs upon the French ſtage in 1738. The author met with every attention in the capital which was due to a man of real genius, and whoſe flaſhes of wit were inexhauſtible. We ſhall inſert a few anecdotes of him, which will ſerve to ſhow his character and turn of mind. In Burgundy the inhabitants of Beaune are called the *Aſſes of Beaune*. Piron often indulged his ſatirical diſpoſition at their expence. One day as he was taking a walk in the neighbourhood of that city, he diverted himſelf with cutting down all the thiſtles which he met with. When a friend aſked him his reaſon for doing ſo, he replied, *J'ai à me plaindre des Beaunois; je leur coupe les vivres*, i. e. "I am ſorry indeed for the Beaunians; for I am cutting down their food." Being told again that theſe people would certainly be revenged of him,

> *Allez*, (ſays he) *Allez : je ne crains point leur impuiſſant couroux ;*
> *Et quand je ſerois ſeul, je les batterois tous.*

"Get you gone, get you gone: I fear not their feeble revenge; for though alone, I ſhould beat them all." Going into a theatre one time where a play was acting, he aſked what it was? The Cheats of Scapin, gravely replied a young Beaunian. "Ah! Sir, (ſays Piron, after thanking him), I took it to be the Cheats of Oreſtes." In the time of the play, ſome body addreſſes the company with "Silence there, gentlemen, we don't hear." "It is not at leaſt (cried Piron) for want of ears." A biſhop one day aſked Piron, during the diſputes about Janſeniſm, "Did you read my mandate, Mr Piron?" No, my lord; and you——The converſation turning very warm, the biſhop reminded him of the diſtance which birth and rank had put between them. "Sir (ſays Piron), I have plainly the ſuperiority over you at this moment; for I am in the right, and you are in the wrong."—Voltaire's Semiramis did not meet with a very favourable reception the firſt time it was acted. The author finding Piron behind the ſcenes, aſked him what he thought of his performance? "I think (replied he) you would have been pleaſed that I had been the author of it." The performer of the character Ferdinand Cortez (the title of one of Piron's tragedies) having requeſted ſome corrections to be made on the play the firſt time it was acted, Piron fired at the word *corrections*. The player, who was deputed to wait upon the author with this requeſt, cited the example of Voltaire, who corrected ſome of his pieces in order to gratify the taſte of the public. "The caſes are widely different (replied Piron); Voltaire works in chequer-work, and I caſt in braſs" If this anſwer be not very modeſt, we muſt allow that it does not want wit. He thought himſelf, if not ſuperior, at leaſt equal to Voltaire. Some perſon congratulating him on having compoſed the beſt comedy of this age, he anſwered, with more frankneſs than modeſty, "Add too, and the beſt tragedy."

gedy." The following verſes are well known, in which he ſays:

En deux mots voulez-vous diſtinguer et connoitre
Le rimeur Dijonnois et le Pariſien?
Le premier ne fut rien, et ne voulut rien etre;
L'autre voulut tout etre, et ne fut preſque rien.

We ſee by theſe different traits that Piron had a ſufficient ſtock of ſelf-conceit. What helped to increaſe it, and make him fancy himſelf ſuperior to the moſt celebrated of his contemporaries, was, that his company, on account of his original humour, of which he had an uncommon ſhare, was more courted than that of Voltaire, who was otherwiſe too lively, too captious, and crabbed. But thoſe who have favoured us with an account of his many witticiſms in converſation, would have done more honour to his memory if they had paſſed over ſuch as were either indecent or inſipid. A thing often pleaſes over a glaſs of wine, which will not give the ſame ſatisfaction when it is repeated, eſpecially if, in repeating it, you want to make it appear of ſome importance. Be that as it may, Piron's miſchievous ingenuity was partly the cauſe which excluded him from the French Academy.—"I could not (ſaid he) make thirty-nine people think as I do, and I could leſs think as thirty-nine do." He called that celebrated ſociety very unjuſtly *les invalides du bel eſprit*, "the invalids of wit;" and yet he often endeavoured to be one of thoſe invalids. His death was haſtened by a fall which he got a little before. He died the 21ſt of January 1773, at the age of 83. He had prepared for himſelf the following epitaph, in the way of an epigram:

Ci gît Piron, qui ne fut rien,
Pas même académicien.

"Here lies Piron, who was nothing, not even an academician."

His wife Maria Thereſa Quenandon, who died in 1751, he deſcribes as a ſweet and moſt agreeable companion. They lived together for ſeveral years; and no huſband ever diſcharged his duty with more fidelity and attention.

A collection of his works appeared in 1776, in 7 vols 8vo, and 9 vols 12mo. The principal pieces are, The School of Fathers; a comedy acted in 1728 under the title of Ungrateful Sons. Calliſthenes; a tragedy, the ſubject of which is taken from Juſtin. The Myſterious Lover, a comedy. Guſtavus and Ferdinand Cortez, two tragedies; ſome ſcenes of which diſcover an original genius, but the verſification neither pleaſes the ear nor affects the heart. Metromany, a comedy. The Courſes of Tempe, an ingenious paſtoral, in which the manners both of the town and country are pleaſantly drawn. Some odes, poems, fables, and epigrams. In this laſt kind of poetry he was very ſucceſsful, and he may be placed after Marot and Rouſſeau. There was no occaſion for loading the public with 7 vols of his works; the half of that number might have ſufficed. For, excepting Metromany, Guſtavus, the Courſes of Tempe, ſome odes, about 20 epigrams, three or four fables, and ſome epiſtles, the reſt are but indifferent, and have no claim to any extraordinary merit.

PISA, a large town of Tuſcany in Italy, ſituated on the river Arno, 52 miles from Florence. It was a famous republic, till ſubdued, firſt by the duke of Milan, and then by the Florentines in the year 1406. Before it loſt its freedom, it is ſaid to have contained near 150,000 inhabitants, but now it has not above 16,000 or 17,000. It was founded, we are told, by the Piſans of Peloponneſus, and afterwards became one of the 12 municipia of Tuſcany. Its neighbourhood to Leghorn, which is now the chief port in the Mediterranean, though formerly of little or no note for trade, has contributed greatly to the decay of Piſa, which, however, begins to lift up its head again, under the auſpices of the preſent grand duke, who has made it his winter reſidence. Between Piſa and Leghorn is a canal 16 Italian miles in length.—Its territory is very fruitful; abounding in corn, wine, and fruit, and fine cattle. The houſes are well built, and the ſtreets even, broad, and well paved; but in many places overrun with graſs. The univerſity is well endowed, and has able profeſſors, but is not in a very flouriſhing condition. The exchange is a ſtately ſtructure, but little frequented. The grand duke's galleys are built, and commonly ſtationed here. This city is alſo the principal reſidence of the order of St Stephen, and the ſee of an archbiſhop. The cathedral, a large Gothic pile, contains a great number of excellent paintings and other curioſities. This church is dedicated to St Mary; is very advantageouſly ſituated in the middle of a large piazza, and built out of a great heap of wrought marble, ſuch as pillars, pedeſtals, capitals, cornices, and architraves, part of the ſpoils which the Piſans took in their eaſtern expeditions, when the republic was in a flouriſhing condition. The roof is ſupported by 76 high marble pillars of different colours, and finely gilt. Both the church and the cupola are covered with lead. The choir is painted by good hands, and the floor is moſaic work. The brazen doors are curiouſly wrought with the hiſtory of the Old and New Teſtament, by Bonanno, an ancient ſtatuary. The chapel of St Rainerius is richly adorned with gilt metals, columns of porphyry, and fine paintings. In the middle of the nave of the church you ſee two brazen tombs, raiſed upon pillars. The marble pulpit was carved by John Piſano, and the choir by Julian da Majana. Joining thereto is the altar, over which is preſerved a hollow globe or veſſel of marble, wherein they kept the ſacrament for the new baptized, according to the opinion of Father Mabillon. In the ſquare before the church, you ſee a pillar upon which is the meaſure of the ancient Roman talent. In the ſame ſquare with the dome, ſtands the baptiſtery, a round fabric ſupported by ſtately pillars, and remarkable for a very extraordinary echo.

On the north ſide of the cathedral is the burying-place, called *Campo Santo*, being covered with earth brought from the Holy Land. This burying-place is incloſed with a broad portico, well painted, and paved with grave ſtones. Here are a great many ancient tombs, among the reſt that of Beatrix, mother of the counteſs Mathilda, with marble baſſo-relievos, which the Piſans brought from Greece, where you ſee the hunt of Meleager, which aſſiſted Nicholas of Piſa in the reſtoration of ſculpture. The walls of the Campo Santo are painted by the beſt maſters of their times. Giotto has drawn ſix hiſtorical pieces of Job; and Andrea Orcagna has given a fine piece of the laſt judgement. Under the portico there is a decree of the city, ordering the inhabitants to wear mourning a year for the death of [illegible]

Near the church you ſee a ſteeple in the form of a cylinder, to which you aſcend by 153 ſteps; it inclines 15 feet on one ſide, which ſome aſcribe to art, but others to the ſinking of the foundation. Its inclination is ſo great that a plumb-line let fall from the top touches the ground at the diſtance of almoſt 15 feet from the bottom. It was built by John of Inſpruck and Bonanno of Piſa, in 1174. Near this ſteeple is a fine hoſpital, dependent on that of St Maria Nuova in Florence.

The ſteeple of the church of the Auguſtinians is alſo very fine, being an octagon, adorned with pillars, and built by Nicholas of Piſa. In the great market-place there is a ſtatue of Plenty, by Pierino da Vinci. In the church of St Matthew, the painting of the ceiling by the brothers Melani, natives of this city, is an admired performance. The church of the knights of St Stephen, decorated with the trophies taken from the Saracens, is all of marble, with marble ſteps, and a front adorned with marble ſtatues. In the ſquare there is a ſtatue of Coſmo I. upon a very fine pedeſtal. Contiguous to the church is the convent or palace of the knights, which is worth ſeeing, as alſo the churches Della Madonna and Della Spina; the laſt of which was built by a beggar, whoſe figure you may ſee on the outſide of the wall. It is pretended that one of the thorns of the crown which was placed on our Saviour's head is preſerved here. Belonging to the univerſity there is a great number of colleges, the chief of which is the Sapienza, where the profeſſors read their public lectures; next to which are the colleges Puteano, Ferdinando, Ricci, and others. Beſides the public palace, and that of the grand duke, there are ſeveral others with marble fronts, the fineſt of which is that of Lanfranchi, which, with the reſt along the banks of the Arno, makes a very fine appearance. There is here a good dock, where they build the galleys, which are conveyed by the Arno to Leghorn. They have a famous aqueduct in this town, conſiſting of 5000 arches, which conveys the water from the hills at five miles diſtance. This water is eſteemed the beſt in Italy, and is carried in flaſks to Florence and Leghorn. The neighbouring country produces great ſtore of corn and wine, but the latter is not much eſteemed. They have very good butter in this neighbourhood, which is a ſcarce commodity in Italy. The city for its defence has a moat, walls, a caſtle, fort, and citadel; the laſt of which is a modern work. The Arno is of a conſiderable breadth here, and has three bridges over it, one of them of marble: two leagues below the town it falls into the ſea. The phyſic-garden is very ſpacious, contains a great number of plants, and is decorated with water-works: over the door leading into it are theſe words, *Hic Argus ſed non Briareus eſto:* i. e. "Employ the eyes of Argus, but not the hands of Briareus. The air is ſaid to be unwholeſome here in ſummer, on account of the neighbouring moraſſes. Many buffaloes are bred in the neighbouring country, and their fleſh is commonly eaten. Between Piſa and Lucca are hot baths. E. Long. 10. 17. N. Lat. 43. 43.

PISCARY, in our ancient ſtatutes, the liberty of fiſhing in another man's waters.

PISCES, in *Aſtronomy*, the 12th ſign or conſtellation of the zodiac.

PISCIDIA, a genus of plants belonging to the diadelphia claſs. See BOTANY *Index*.

PISCIDIA Erythrina, or *Dogwood-tree*, is employed to intoxicate fiſh. For this purpoſe, the bark is pounded ſmall, put into bags, and ſoaked in ſalt water. The juice, which is of a red colour, makes the fiſh ſtupid, ſo that they are eaſily taken.

PISCINA, in antiquity, a large baſon in a public place or ſquare, where the Roman youth learned to ſwim: and which was ſurrounded with a high wall, to prevent filth from being thrown into it.—This word is alſo uſed for a lavatory among the Turks, placed in the middle court of a moſque or temple, where the Muſſulmans waſh themſelves before they offer their prayers.

Bibliotheca Claſſica, by Lempriere.

PISISTRATUS, an Athenian who early diſtinguiſhed himſelf by his valour in the field, and by his addreſs and eloquence at home. After he had rendered himſelf the favourite of the populace by his liberality and by the intrepidity with which he had fought their battles, particularly near Salamis, he reſolved to make himſelf maſter of his country. Every thing ſeemed favourable to his ambitious views; but Solon alone, who was then at the head of affairs, and who had lately enforced his celebrated laws, oppoſed him, and diſcovered his duplicity and artful behaviour before the public aſſembly. Piſiſtratus was not diſheartened by the meaſures of his relation Solon, but he had recourſe to artifice. In returning from his country-houſe, he cut himſelf in various places; and after he had expoſed his mangled body to the eyes of the populace, deplored his misfortunes, and accuſed his enemies of attempts upon his life, becauſe he was the friend of the people, the guardian of the poor, and the reliever of the oppreſſed, he claimed a choſen body of 50 men from the populace to defend his perſon in future from the malevolence and the cruelty of his enemies. The unſuſpecting people unanimouſly granted his requeſt, though Solon oppoſed it with all his influence; and Piſiſtratus had no ſooner received an armed band on whoſe fidelity and attachment he could rely, than he ſeized the citadel of Athens, and made himſelf abſolute. The people too late perceived their credulity; yet, though the tyrant was popular, two of the citizens, Megacles and Lycurgus, conſpired together againſt him, and by their means he was forcibly ejected from the city. His houſe and all his effects were expoſed to ſale; but there was found in Athens only one man who would buy them. The private diſſenſions of the friends of liberty proved favourable to the expelled tyrant; and Megacles, who was jealous of Lycurgus, ſecretly promiſed to reſtore Piſiſtratus to all his rights and privileges in Athens, if he would marry his daughter. Piſiſtratus conſented; and by the aſſiſtance of his father-in-law, he was ſoon enabled to expel Lycurgus, and to re-eſtabliſh himſelf. By means of a woman called *Phya*, whoſe ſhape was tall, whoſe features were noble and commanding, he impoſed upon the people, and created himſelf adherents even among his enemies. Phya was conducted through the ſtreets of the city, and ſhowing herſelf ſubſervient to the artifice of Piſiſtratus, ſhe was announced as Minerva, the goddeſs of wiſdom, and the patroneſs of Athens, who was come down from Heaven to re-eſtabliſh her favourite Piſiſtratus in a power which was ſanctioned by the will of Heaven, and favoured by the affection of the people. In the midſt of his triumph, however, Piſiſtratus found himſelf unſupported; and ſome time after, when he repudiated the daughter of Megacles, he found that not only the citizens, but even his very troops, were alienated from him by the influence, the intrigues, and the bribery of his father-in-law. He fled from Athens where he no longer could maintain his power, and retired to Eubœa. Eleven years after he was drawn from his obſcure retreat, by means of his ſon Hippias, and he was a third time received by the people of Athens as their maſter and ſovereign. Upon this he ſacrificed to his reſentment the friends of Megacles, but he did not loſe ſight of the public good, and while he ſought the aggrandizement of his family, he did not neglect the dignity and the honour of the Athenian name. He died about 528 years before the Chriſtian era, after he had enjoyed the ſovereign power at Athens for 33 years, and he was ſucceeded by his ſon Hipparchus. Piſiſtratus claims our admiration for his juſtice, his liberality, and his moderation. If he was dreaded and deteſted as a tyrant, the Athenians loved and reſpected his private virtues and his patriotiſm as a fellow-citizen: and the opprobrium which generally falls on his head may be attributed not to the ſeverity of his adminiſtration, but to the republican principles of the Athenians, who hated and exclaimed againſt the moderation and equity of the mildeſt ſovereign, while they flattered the pride and gratified the guilty deſires of the moſt tyrannical of their fellow ſubjects. Piſiſtratus often refuſed to puniſh the inſolence of his enemies; and when he had one day been virulently accuſed of murder, rather than inflict immediate puniſhment upon the man who had criminated him, he went to the areopagus, and there convinced the Athenians that the accuſations of his enemies were groundleſs, and that his life was irreproachable. It is to his labours that we are indebted for the preſervation of the poems of Homer; and he was the firſt, according to Cicero, who introduced them at Athens in the order in which they now ſtand. He alſo eſtabliſhed a public library at Athens; and the valuable books which he had diligently collected were carried into Perſia when Xerxes made himſelf maſter of the capital of Attica. Hipparchus and Hippias the ſons of Piſiſtratus, who had received the name of *Piſiſtratidæ*, rendered themſelves as illuſtrious as their father; but the flames of liberty were too powerful to be extinguiſhed. The Piſiſtratidæ governed with great moderation, but the name of tyrant or ſovereign was inſupportable to the Athenians. Two of the moſt reſpectable of the citizens, called *Harmodius* and *Ariſtogiton*, conſpired againſt them, and Hipparchus was diſpatched in a public aſſembly. This murder was not, however, attended with any advantages; and though the two leaders of the conſpiracy, who have been celebrated through every age for their patriotiſm, were ſupported by the people, yet Hippias quelled the tumult by his uncommon firmneſs and prudence, and for a while preſerved that peace in Athens which his father had often been unable to command. This was not long to continue. Hippias was at laſt expelled by the united efforts of the Athenians and of their allies, and he left Attica, when he found himſelf unable to maintain his power and independence. The reſt of the family of Piſiſtratus followed him in his baniſhment; and after they had refuſed to accept the liberal offers of the princes of Theſſaly, and the king of Macedonia, who wiſhed them to ſettle in their reſpective territories, the Piſiſtratidæ retired to Sigæum, which their father had in the ſummit of his power conquered and bequeathed to his poſterity. After the baniſhment of the Piſiſtratidæ, the Athenians became more than commonly jealous of their liberty, and often ſacrificed the moſt powerful of their citizens, apprehenſive of the influence which popularity and a well directed liberality might gain among a fickle and unſettled populace. The Piſiſtratidæ were baniſhed from Athens about 18 years after the death of Piſiſtratus.

PISMIRES, or Ants, are a kind of inſects very common in Africa; of which there is ſo great a variety, and ſuch innumerable ſwarms, that they deſtroy not only the fruits of the ground but ſometimes even men and beaſts in ſo little time as one ſingle night; and would, without all doubt, prove more fatally deſtructive to the inhabitants, were they not ſo happily deſtroyed by a proportionable number of monkeys and other animals, who greedily devour them. The far greater part of the vaſt continent of Africa is afflicted with theſe and ſome other grievous plagues, and particularly with the horrid viſitation of locuſts, which ſeldom fail a year of laying waſte ſome of the provinces.

PISO, Lucius Calpurnius, ſurnamed *Frugi* on account of his frugality, was deſcended of the illuſtrious family of the Piſos, which gave ſo many great men to the Roman republic. He was tribune of the people in the year 149 before Chriſt, and afterwards conſul. During his tribuneſhip, he publiſhed a law againſt the crime of concuſſion or extortion, intitled *Lex Calpurnia de pecuniis repetundis*. He happily ended the war in Sicily. To reward the ſervices of one of his ſons, who had diſtinguiſhed himſelf in that expedition, he left him by his will a golden crown, weighing 20 pounds. Piſo joined to the qualities of a good citizen the talents of a lawyer, an orator, and hiſtorian.

Piso, *Caius Calpurnius*, a Roman conſul in the year 67 before Chriſt, was author of the law which forbade canvaſſing for public offices, intitled *Lex Calpurnia de ambitu*. He diſplayed all the firmneſs worthy of a conſul in one of the moſt ſtormy periods of the republic. The Roman people, deceived by the flattery of Marcus Palicanus, a turbulent and ſeditious fellow, were on the eve of loading themſelves with the greateſt diſgrace, by putting the ſupreme authority into the hands of this man, who deſerved puniſhment rather than honours. The tribunes of the people, by their harangues, inflamed the blind fury of the multitude, already ſufficiently mutinous of themſelves. In this ſituation, Piſo mounted the roſtrum, and being aſked if he would declare Palicanus conſul, in caſe the ſuffrages of the people ſhould concur in the nomination, he inſtantly replied, that "he did not think the republic was yet involved in ſuch darkneſs and deſpair as to be capable of committing ſo infamous an action." Being afterwards ſtrongly and repeatedly called upon to ſay, "what he would do, if the thing ſhould happen?" his anſwer was, "No, I would not name him." By this firm and laconic anſwer he deprived Palicanus of the dignity to which he aſpired. Piſo, according to Cicero, was not poſſeſſed of a quick conception, but he thought maturely, and with judgment, and, by a proper firmneſs, he appeared to be an abler man than he really was.

Piso, *Cneius Calpurnius*, was conſul in the reign of Auguſtus, and governor of Syria under Tiberius, whoſe confidant he was. It is ſaid, that by the order of this emperor he cauſed Germanicus to be poiſoned. Being accuſed of that crime, and ſeeing himſelf abandoned by every body, he laid violent hands on himſelf in the 20th year of our Lord. He was a man of inſupportable pride and exceſſive violence. Some inſtances of his wicked cruelty have been handed down to us. Having given orders in the heat of his paſſion to conduct to puniſhment a ſoldier, as guilty of the death of one of his companions, becauſe he had gone out of the camp with him and returned without him, no prayers or intreaty could prevail with Piſo to ſuſpend the execution of this ſentence until the affair ſhould be properly inveſtigated. The ſoldier was led without the entrenchments, and had already preſented his head to receive the fatal ſtroke, when his companion whom he was accuſed of having killed made his appearance again. Whereupon the centurion, whoſe office it was to ſee the ſentence executed, ordered the executioner to put up his ſword into the ſcabbard. Thoſe two companions, after embracing each other, are conducted to Piſo, amidſt the acclamations of the whole army, and a prodigious crowd of people. Piſo, foaming with rage, aſcends his tribune, and pronounces the ſame ſentence of death againſt the whole three, without excepting the centurion who had brought back the condemned ſoldier, in theſe terms: "You I order to be put to death becauſe you have been already condemned: you, becauſe you have been the cauſe of the condemnation of your comrade; and you, becauſe having got orders to put that ſoldier to death, you have not obeyed your prince."

PISSASPHALTUM, or Asphaltum, Earth-pitch; a fluid, opaque, mineral body, of a thick conſiſtence, ſtrong ſmell, readily inflammable, but leaving a reſiduum of greyiſh aſhes after burning. It ariſes out of the cracks of the rocks, in ſeveral places in the iſland of Sumatra, and ſome other places in the Eaſt Indies, where it is much eſteemed in paralytic diſorders. There is a remarkable mine of it in the iſland of Bua, (ſee Bua), of which the following curious deſcription is given us by the Abbe Fortis. "The iſland is divided into two promontories between the north and weſt. Croſſing over the top of the latter, which is not half a mile broad, and deſcending in a right line towards the ſea, one is conducted to a hole well known to the inhabitants. This hole extends not much above 12 feet, and from its bottom above 25 feet perpendicular, ariſe the marble ſtrata which ſuſtain the irregular maſſes that ſurround the top of the mountain.

This piſſaſphaltum is of the moſt perfect quality, black and ſhining, very pure, odorous, and coheſive; and it comes out almoſt liquid, but hardens in large drops when the ſun ſets. On breaking many of theſe drops on the ſpot, I found that almoſt every one of them had an inner cavity full of very clear water.

"The greateſt breadth of the tears that I ſaw was two inches, and the common breadth is half an inch. The chinks and fiſſures of the marble, from whence this bituminous pitch tranſudes, are not more than the thickneſs of a thread; and for the moſt part are ſo imperceptible, that were it not for the pitch itſelf, whereby they are blackened, they could not by any means be diſtinguiſhed by the naked eye. To the narrowneſs of theſe paſſages is, no doubt, in part owing the ſmall quantity of piſſaſphaltum that tranſpires."

After ſome conjectures about the origin of this mine, our author proceeds to inform us that the piſſaſphaltum of Bua is correſpondent to that foſſil production which by Haſſelquiſt, in his Travels, is called *mumia minerale*, and *mumia nativa Perſiana* by Kempfer, which the Egyptians made uſe of to embalm their kings (A). It is found in a cave of Mount Caucaſus, which is kept ſhut, and carefully guarded by order of the king of Perſia. One of the qualities aſſigned by M. Linnæus to the fineſt bitumen is to ſmoke when laid on the fire, as ours does, emitting a ſmell of pitch not diſagreeable. He believes it would be very good for wounds, as the oriental mumia is, and like the pitch of Caſtro, which is frequently uſed by the Roman chirurgeons for fractures, contuſions, and in many external applications. See Asphaltum, Mineralogy *Index*.

PISSELÆUM indicum, *Barbadoes Tar;* a mineral fluid of the nature of the thicker bitumens, and of all others the moſt approaching, in appearance, colour, and conſiſtence, to the true piſſaſphaltum, but differing from it in other reſpects. It is very frequent in many parts of America, where it is found trickling down the ſides of mountains in large quantities, and ſometimes floating on the ſurface of the waters. It has been greatly recommended internally in coughs and other diſorders of the breaſt and lungs.

PISTACIA, Turpentine-tree, *Piſtachia nut* and *Maſtick-tree;* a genus of plants belonging to the dioecia claſs. The moſt remarkable ſpecies are, 1. The terebinthus, or piſtachia-tree, which grows naturally in Arabia, Perſia, and Syria, whence the nuts are annually brought to Europe. In thoſe countries it grows to the height

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(A) "Mumiahi, or native Perſian mummy. It proceeds from a hard rock in very ſmall quantity. It is a bituminous juice, that tranſudes from the ſtony ſuperficies of the hill, reſembling in appearance coarſe ſhoemakers wax, as well in its colour as in its denſity and ductility. While adherent to the rock it is leſs ſolid, but is formed by the warmth of the hands. It is eaſily united with oil, but repels water; it is quite void of ſmell, and very like in ſubſtance to the Egyptian mummy. When laid on burning coals, it has the ſmell of ſulphur tempered a little with that of naphtha, not diſagreeable. There are two kinds of this mummy; the one is valuable for its ſcarcity and great activity. The native place of the beſt mummy is far from the acceſs of men, from habitations, and from ſprings of water, in the province of Daraab. It is found in a narrow cave, not above two fathoms deep, cut like a well out of the maſs, at the foot of the rugged mountain Caucaſus."——*Kempfer. Amœn. Perſ.*

This deſcription agrees perfectly with the piſſaſphaltum or foſſil mummy of Bua, differing only in the privation of ſmell, which it is difficult to imagine is totally wanting in the Perſian mummy.

Piſtachia. height of 25 or 30 feet: the bark of the ſtem and old branches is of a dark ruſſet colour, but that of the young branches is of a light brown. Theſe are garniſhed with winged leaves, compoſed ſometimes of two, at other times of three, pair of lobes, terminated by an odd one: theſe lobes approach towards an oval ſhape, and their edges are turned backward; and theſe, when bruiſed, emit a ſmell ſimilar to that of the ſhell of the nut. Some of theſe trees produce male and others female flowers, and ſome have both male and female on the ſame tree. The male flowers come out from the ſides of the branches in looſe bunches or catkins. They have no petals, but five ſmall ſtamina crowned by large four-cornered ſummits filled with farina; and when this is diſcharged, the flowers fall off. The female flowers come out in cluſters from the ſides of the branches: they have no petals, but a large oval germen ſupporting three reflexed ſtyles, and are ſucceeded by oval nuts. 2. The lentiſcus, or common maſtich tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preſerved in this country in order to adorn the green-houſes. In the countries where it is a native, it riſes to the height of 18 or 20 feet, covered with a grey bark on the ſtem; but the branches, which are very numerous, are covered with a reddiſh brown bark, and are garniſhed with winged leaves, compoſed of three or four pair of ſmall ſpear-ſhaped lobes, without an odd one at the end. 3. The orientalis, or true maſtich-tree of the Levant, from which the maſtich is gathered, has been confounded by moſt botanical writers with the lentiſcus, or common maſtich tree, above deſcribed, though there are conſiderable differences between them. The bark of the tree is brown; the leaves are compoſed of two or three pair of ſpear-ſhaped lobes, terminated by an odd one: the outer lobes are the largeſt; the others gradually diminiſh, the innermoſt being the leaſt. Theſe turn of a browniſh colour towards the autumn, when the plants are expoſed to the open air; but if they are under glaſſes, they keep green. The leaves continue all the year, but are not ſo thick as thoſe of the common ſort, nor are the plants ſo hardy.

Culture. The firſt ſpecies is propagated by its nuts, which ſhould be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot bed to bring up the plants: when theſe appear, they ſhould have a large ſhare of air admitted to them, and by degrees they ſhould be expoſed to the open air, which at laſt they will bear in all ſeaſons, though not without great danger of being deſtroyed in ſevere winters. The ſecond ſort is commonly propagated by laying down the branches, though it may alſo be raiſed from the ſeed in the manner already directed for the piſtachia-nut tree: and in this manner alſo may the true maſtich-tree be raiſed. But this being more tender than any of the other ſorts, requires to be conſtantly ſheltered in winter, and to have a warm ſituation in ſummer.

Piſtachia nuts are moderately large, containing a kernel of a pale greeniſh colour, covered with a reddiſh ſkin. They have a pleaſant, ſweet, unctuous taſte, reſembling that of almonds; and they abound with a ſweet and well-taſted oil, which they yield in great abundance on being preſſed after bruiſing them: they are reckoned amongſt the analeptics, and are wholeſome and nutritive, and are by ſome eſteemed very proper to be preſcribed by way of reſtoratives, eaten in ſmall quantity, to people emaciated by long illneſs.

PISTIL, among botaniſts, the little upright column which is generally found in the centre of every flower. According to the Linnæan ſyſtem, it is the female part of generation, whoſe office is to receive and ſecrete the pollen, and produce the fruit. It conſiſts of three parts, viz. germen, ſtylus, and ſtigma. See BOTANY *Index*.

PISTOIA is a city of Italy, in the duchy of Tuſcany, ſituated on the river Stella, in a beautiful plain near the foot of the Apennine mountains. By Pliny it is called *Piſtorium*, and is ſaid to have been once a Roman colony. At preſent it is a biſhop's ſee, ſuffragan of Florence. The ſtreets are broad and regular, the houſes tolerably well built, but poorly inhabited for want of trade. Formerly it was an independent republic, but ſince it was ſubdued by the Florentines in 1200, it has been in a declining condition. The cathedral has a very handſome cupola, and a magnificent ſtaircaſe to aſcend to it. In the chapel dedicated to St James, where his relics are preſerved, the walls are almoſt covered with plates of ſilver. Here are four marble ſtatues of very good workmanſhip. The marble pulpit, the baſſo-relievos, the veſſel that holds the holy water, and the ſquare ſteeple, are the work of John Piſano. The Jeſuits have a very fine college, and the Franciſcans, Dominicans, and Auguſtinians, good churches. In the church of Madonna dell' Umilta there are two ſtatues, one of Leo X. and the other of Clement VII. The public palace, ſituated in a large ſquare, is a handſome building; ſeveral of the nobility have alſo very good houſes. In the neighbouring mountains, called by the name of Piſtoia, there are many large villages, the chief of which is that of S. Marcello, belonging to the family of Cartoli. Theſe mountains are a part of the Apennines, and border on the territory of Bologna and the county of Vernio; higher up is the ſource of the river Reno. The country about Piſtoia, eſpecially towards Florence, is exceeding fertile and delightful, covered with all ſorts of fruits, corn, wine, &c. and containing a vaſt number of little towns, wealthy villages, and country ſeats, ſo as to be reckoned the richeſt and moſt beautiful in all Tuſcany. It is about 20 miles N. W. of Florence, and 30 N. E. of Piſa, E. Long. 11. 29. N. Lat. 43. 55.

PISTOL, the ſmalleſt piece of fire-arms, borne at the ſaddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin, ſtruck in Spain and in ſeveral parts of Italy, Switzerland, &c.—The piſtole has its augmentations and diminutions, which are quadruple piſtoles, double piſtoles, and half piſtoles. See MONEY-*Table*.

PISTON, in pump-work, is a ſhort cylinder of metal or other ſolid ſubſtance, fitted exactly to the cavity of the barrel or body of the pump. See HYDRODYNAMICS.

PISUM, PEASE: a genus of plants belonging to the diadelphia claſs. See BOTANY *Index*. The ſpecies are, 1. The ſativum, or greater garden-pea, whoſe lower ſtipules are roundiſh, indented, with taper foot-ſtalks, and many flowers on each foot-ſtalk. 2. The humile, or dwarf pea, with an erect branching ſtalk, and leaves having two pair of round lobes. 3. The umbellatum, or crown pea, with four pointed acute ſtipuli, and foot-ſtalks bearing many flowers, which terminate the ſtalks. 4. The maritimum, or ſea-pea, with foot-ſtalks which are plain on their upper ſide, an angular ſtalk, arrow-pointed ſtipulæ, and foot-ſtalks bearing many flowers. 5. The Americanum, commonly called *Cape-Horn pea*, with an angular trailing ſtalk, whoſe lower leaves are ſpear-ſhaped, ſharply indented, and thoſe at the top arrow-pointed. 6. The ochrus, with membranaceous running foot-ſtalks, having two leaves and one flower upon a foot-ſtalk.

There is a great variety of garden-peaſe now cultivated in Britain, which are diſtinguiſhed by gardeners and ſeedſmen, and have their different titles; but as great part of theſe have been ſeminal variations, ſo if they are not very carefully managed, by taking away all thoſe plants which have a tendency to alter before the ſeeds are formed, they will degenerate into their original ſtate: therefore all thoſe perſons who are curious in the choice of their ſeeds, look carefully over thoſe which they deſign for ſeeds at the time when they begin to flower, and draw out all the plants which they diſtike from the other. This is what they call *roguing their peaſe;* meaning hereby the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which, they always do it before the flowers open. By thus diligently drawing out the bad, reſerving thoſe which come earlieſt to flower, they have greatly improved their peaſe of late years, and are conſtantly endeavouring to get forwarder varieties; ſo that it would be to little purpoſe in this place to attempt giving a particular account of all the varieties now cultivated: we ſhall therefore only mention the names by which they are commonly known, placing them according to their time of coming to the table, or gathering for uſe.

The golden hotſpur.
The Charlton.
The Reading hotſpur.
Maſter's hotſpur.
Eſſex hotſpur.
The dwarf pea.
The ſugar pea.
Spaniſh Morotto.
Nonpareil.
Sugar dwarf.
Sickle pea.
Marrowfat.
Roſe or crown pea.
Rouncival pea.
Gray pea.
Pig pea; with ſome others.

The Engliſh ſea-pea is found wild upon the ſhore in Suſſex and ſeveral other counties in England, and is undoubtedly a different ſpecies from the common pea.

The fifth ſpecies hath a biennial root, which continues two years. This was brought from Cape Horn by Lord Anſon's cook, when he paſſed that cape, where theſe peaſe were a great relief to the ſailors. It is kept here as a curioſity, but the peaſe are not ſo good for eating as the worſt ſort now cultivated in Britain. It is a low trailing plant; the leaves have two lobes on each foot-ſtalk: thoſe below are ſpear-ſhaped, and ſharply indented on their edges; but the upper leaves are ſmall, and arrow-pointed. The flowers are blue, each foot-ſtalk ſuſtaining four or five flowers; the pods are taper, near three inches long; and the ſeeds are round, about the ſize of tares.

The ſixth ſort is annual. This grows naturally among the corn in Sicily and ſome parts of Italy, but is here preſerved in botanic gardens for the ſake of variety. It hath an angular ſtalk, riſing near three feet high; the leaves ſtand upon winged foot-ſtalks, each ſuſtaining two oblong lobes. The flowers are of a pale yellow colour, ſhaped like thoſe of the other ſort of pea, but are ſmall, each foot-ſtalk ſuſtaining one flower; theſe are ſucceeded by pods about two inches long, containing five or ſix roundiſh ſeeds, which are a little compreſſed on their ſides. Theſe are by ſome perſons eaten green; but unleſs they are gathered very young, they are coarſe, and at beſt not ſo good as the common pea. It may be ſown and managed in the ſame way as the garden pea.

For an account of the method of cultivating the ſeveral ſorts of garden peaſe, ſo as to continue them throughout the ſeaſon, ſee GARDENING.

The gray and other large winter peaſe are ſeldom cultivated in gardens, becauſe they require a great deal of room; they are therefore uſually ſown in fields. For the proper method of managing them, ſee AGRICULTURE.

In the *Muſeum Ruſticum*, vol. i. p. 109. we find the following method of preparing peaſe for hog-meat, which we ſhall give in the words of the ingenious farmer who communicated it.

"A few years ago (ſays he), I had a plentiful crop of peaſe on a ten acre piece, which lies near my houſe: when they were full podded and nearly ripe, I had them hooked in the uſual manner; but before I could get them in, there came a heavy ſhower of rain which wetted them through and through; and the dull heavy weather, with frequent ſhowers which followed, prevented their drying for a conſiderable time.

"I cauſed the wads to be from time to time turned, to prevent the haulm from rotting; and at length a few days ſunſhine dried them enough to be inned; for as they lay hollow, the wind was greatly aſſiſtant to the operation.

"Before I got them in, on examining ſome of the pods, I found that the peaſe were all ſprouted to a conſiderable length: this was what I had expected, as I gave my crop over for loſt, till after a little recollection, as the weather ſtill continued fine, I determined to threſh them in the field.

"This was accordingly done; and the corn, after it was caſt and riddled to ſeparate it from the rubbiſh, was dried on my malt kiln.

"When this operation was over, I began to reflect in what manner I ſhould diſpoſe of my peaſe, being ſenſible that they could not be proper for ſeed, and ſtanding no chance of diſpoſing of them to any advantage in the market.

"At length, as it was then a time of war, and of courſe there was a great demand for pork for the uſe of the navy, I determined to buy a conſiderable number of lean hogs, that I might by their means conſume this crop on my own premiſes, and in that manner make the moſt of it.

"My expectations were more than anſwered; for I found, by repeated experience, that three buſhels of the peaſe I have mentioned went nearly as far in fattening the hogs I bought as four buſhels got in dry and hard in the manner uſually practiſed.

"This diſcovery I made ſeveral years ago, and it has turned out to my advantage; for ſince that time I have been quite indifferent as to the weather in which my peaſe are hooked, being rather better pleaſed, as far as relates to them, with wet than dry weather;

ther; but if the weather happens to be dry at the time they are ripe, I always cauſe as many as I want for feeding my hogs, which are not a few in a year, to be regularly malted in the ſame manner nearly as my barley: this management has of late ſucceeded very well with me, and I therefore intend to continue it.

"Beſides feeding my hogs with theſe malted peaſe, I have often given them to my horſes, with which they agree very well, and are heartening food.

"Turkeys will fatten apace on them alſo, and be fine meat.

"I have applied my malted peaſe to many other uſes, which I have not at preſent time to enumerate: but were they only uſed for feeding hogs and horſes, it is ſtill worth while to prepare ſome in this manner every year."

PIT COAL, or STONE-COAL. See COAL, MINERALOGY *Index*, and COALERY.

The coal-trade is of infinite importance to Great Britain, which never could have arrived at its preſent commercial eminence without it; and this eminence it will be impoſſible to retain if coal ſhould ever become ſcarce. This we truſt is not likely to be the caſe, though Mr Williams expreſſes great fears for it, and informs us that at Newcaſtle and in many parts of Scotland, the mines near the ſea are already waſted, the firſt conſequence of which muſt be an enormous riſe in the price. See his obſervations on this ſubject in his *Natural Hiſtory of the Mineral Kingdom*. This author ſays, that coal was not diſcovered till between the middle of the 12th and beginning of the 13th centuries: it is therefore, according to him, 400 years ſince it was firſt diſcovered in Britain, but they have not been in common uſe for more than 200 years. The ſame author makes many excellent obſervations on the appearances and indications of coal, inſtructions about ſearching for it, remarks on falſe and doubtful ſymptoms of coal; for all which, together with his obſervations on the different kinds of Scots coal, we ſhall refer our readers to the work itſelf; the firſt part of which, occupying a large proportion of it, is upon the *ſtrata of coal*, and on the *concomitant ſtrata*. See GEOLOGY and STRATA *of the earth*.

PITAHAYA (*Cactus Pitajaya*. Lin. *Syſt Vegetabilium*. *Jacquin Amer*. 151. ed. 2d. p. 75. M. *E. Carthagena*), a ſhrub peculiar to California, the fruit of which forms the greateſt part of the harveſt of the natives. Its branches are finely fluted, and riſe vertically from the ſtem, ſo as to form a very beautiful top. The fruit is like a horſe-cheſnut; in ſome white, in others yellow, and in others red, but always exquiſitely delicious, being a rich ſweet, tempered with a grateful acid. See CACTUS, BOTANY *Index*.

PITCAIRNE, DR ARCHIBALD, an eminent phyſician and ingenious poet, was deſcended from the ancient family of the Pitcairnes of Pitcairne in Fifeſhire, and was born at Edinburgh on the 25th of December 1652. He commenced his ſtudies at the ſchool of Dalkeith; and from thence he was removed to the univerſity of Edinburgh, where he improved himſelf in claſſical learning, and completed a regular courſe of philoſophy. His friends, according to the authors of the *Biographia Britannica*, were deſirous that he ſhould follow the profeſſion of theology. The unpleaſant gloom, however, which at that time hung over religion and its profeſſors in Scotland, could not but very ill ſuit with that native cheerfulneſs of temper and liberality of mind which made him, long after, a mark for the arrows of preciſeneſs and grimace. The law ſeems to have been his own choice, and to this ſcience he turned his attention. With an ardour peculiar to himſelf, and an ambition to excel in whatever he undertook, he purſued it with ſo much intenſeneſs, that his health began to be impaired. On this account, his phyſicians adviſed him to ſet out for the ſouth of France. By the time he reached Paris, he was happily ſo far recovered, that he determined to renew his ſtudies; but being informed that there was no able profeſſor of law in that city, and finding ſeveral gentlemen of his acquaintance engaged in the ſtudy of phyſic, he went with them to the lectures and hoſpitals, and employed himſelf in this manner for ſeveral months till his affairs called him home.

On his return, he applied himſelf chiefly to the mathematics. It is not uſual to ſee the briars of this ſcience and the flowers of poetry growing in the ſame ſoil. Here, however, they were happily united; and to this union perhaps was owing that ſingular command of judgement, over one of the livelieſt of fancies, which appears in every part of his works. His intimacy with Dr David Gregory, the celebrated mathematical profeſſor, began about the ſame time; and probably conduced to cheriſh his natural aptitude for this ſtudy. It was then in a great meaſure, new to him; it ſoon became his principal delight; his progreſs in it was rapid, and correſpondent to his progreſs in other purſuits. His improvements on the method of infinite ſeries then adopted, which Dr Wallis of Oxford afterwards publiſhed, were a conſpicuous and early proof of his abilities in this ſcience.

Had Dr Pitcairne continued to proſecute the ſtudy of the law, and could he have moulded his principles to the times, the firſt offices and honours of the ſtate might have been looked for without preſumption as the probable reward of ſuch talents as he poſſeſſed. Struck, however with the charms of mathematical truth which had been lately introduced into the philoſophy of medicine, and hoping to reduce the healing art to geometrical method, he unalterably determined on this leſs aſpiring profeſſion. At the period when he formed this reſolution, the ideas of the medical world, already ſufficiently confuſed, were ſtill farther jumbled by the diſcovery of the circulation of the blood, which had as yet produced nothing but doubt, uncertainty, and aſtoniſhment. In Edinburgh at that time there was no ſchool, no hoſpital, no opportunity of improvement but the chamber and the ſhop. He therefore ſoon after returned to Paris. Genius and induſtry are unhappily not often united in the ſame character: of ſuch an union, however, Dr Pitcairne is a celebrated inſtance. During his reſidence in France, he cultivated the object of his purſuit with his natural enthuſiaſm, and with a ſteadineſs from which he could not be diverted by the allurements of that joy which, in his hours of ſocial and feſtive intercourſe, he always felt and always gave. Among his various occupations, the ſtudy of the ancient phyſicians ſeems to have had a principal ſhare. This appears from a treatiſe which he publiſhed ſome time after his return; and it ſhows, that he was [illegible] to know the progreſs of medicine from its earlieſt periods, before he attempted to reform and improve that ſcience.

On the 13th of Auguſt 1680, he received, from the faculty of Rheims the degree of Doctor; which, on the 7th of Auguſt 1699, was likewiſe conferred on him by the univerſity of Aberdeen; both being attended with marks of peculiar diſtinction. Other medical honours are ſaid to have been conferred on him in France and elſewhere; but nothing affords a more unequivocal teſtimony to his abilities than that which the ſurgeons of Edinburgh gave, in admitting him, freely and unſolicited, a member of their college. None had ſuch opportunities of judging of his merit as a practitioner, and on no phyſician did they ever beſtow the ſame public mark of reſpect. Soon after his graduation at Rheims, he returned to Edinburgh; where, on the 29th of November 1681, the Royal College of Phyſicians was inſtituted; and his name, among others, graced the original patent from the crown.

In his *Solutio Problematis de Inventoribus*, the treatiſe above alluded to, he diſcovers a wonderful degree of medical literature, and makes uſe of it in a manner that does great honour both to his head and his heart. His object is to vindicate Dr Harvey's claim to the diſcovery of the circulation of the blood. The diſcovery was, at firſt, controverted by envy, and reprobated by ignorance. When at length its truth was fully eſtabliſhed, many invidiouſly attempted to tear the laurels from the illuſtrious Engliſhman, and to plant them on the brows of Hippocrates and others. Had the attempt been directed againſt himſelf, the generous ſoul of Pitcairne could not have exerted more zeal in a defence; and his arguments remain unanſwered.

During his reſidence in Scotland, his reputation became ſo conſiderable, that, in the year 1691, the univerſity of Leyden ſolicited him to fill the medical chair, at that time vacant. Such an honourable teſtimony of reſpect, from a foreign nation, and from ſuch an univerſity, cannot perhaps be produced in the medical biography of Great Britain. The luſtre of ſuch characters reflects honour on their profeſſion, and on the country which has the good fortune of giving them birth; and ſerves to give the individuals of that country not only a uſeful eſtimation in their own eyes, but in thoſe alſo of the reſt of the world. Dr Pitcairne's well-known political principles excluded him from public honours and promotion at home: he therefore accepted the invitation from abroad; and, on the 26th of April 1692, delivered, at Leyden, his elegant and maſterly inaugural oration: *Oratio qua oſtenditur medicinam ab omni philoſophorum ſecta eſſe liberam.* In this he clears medicine from the rubbiſh of the old philoſophy; ſeparates it from the influence of the different ſects; places it on the broad and only ſure foundation of experience; ſhows how little good inquiries into the manner how medicines operate have done to the art; and demonſtrates the neceſſity of a ſedulous attention to their effects, and to the various appearances of diſeaſe.

Nothing (ſays an elegant panegyriſt * of our author) marks a ſuperiority of intellect ſo much as the courage requiſite to ſtem a torrent of obſtinately prevailing and groundleſs opinions. For this the genius and talents of Pitcairne were admirably adapted; and, in his oration, he diſplays them to the utmoſt. It was received with the higheſt commendations; and the adminiſtrators, to teſtify their ſenſe of ſuch an acquiſition to their univerſity, greatly augmented the ordinary appointment of his chair.

* Dr Chas. Webſter, in the *Eulogium Pitcairnianum* at Edinburgh in the year 1781; from which performance the preſent article is chiefly extracted.

He diſcharged the duties of his office at Leyden ſo as to anſwer the moſt ſanguine expectations. He taught with a perſpicuity and eloquence which met with univerſal applauſe. Independently of the encomiums of Boerhaave and Mead, who were his pupils, the numerous manuſcript copies of his lectures, and the mutilated ſpecimen of them † which found its way into the world without his knowledge, ſhow how juſtly it was beſtowed. At the ſame time, he was not more celebrated as a profeſſor than as a practical phyſician; and notwithſtanding the multiplicity of his buſineſs in both theſe characters, he found leiſure to publiſh ſeveral treatiſes on the circulation, and ſome other of the moſt important parts of the animal economy (A).

† *Elementa Medicinæ.*

At the cloſe of the ſeſſion he ſet out for Scotland, with an intention of returning in time for the ſucceeding one. On his marrying (B) the daughter of Sir Archibald Stevenſon, the object of his journey, her relations would on no account conſent to part with him again. He was therefore reluctantly obliged to remain; and he wrote the univerſity a polite apology, which was received with the utmoſt regret. He even declined the moſt flattering ſolicitations and tempting offers to ſettle in London. Indeed he ſoon came into that extenſive practice to which his abilities entitled him, and was alſo appointed titular profeſſor of medicine in the univerſity of Edinburgh.

The uniformity of a profeſſional life is ſeldom interrupted by incidents worthy of record. Specimens, however, of that brilliant wit with which he delighted his friends in the hours of his leiſure, continue to entertain us (C): and the effects of that eminent ſkill which he exerted

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(A) Dr Boerhaave gives the following character of theſe and ſome other of Dr Pitcairne's diſſertations, which were collected and publiſhed at Rotterdam, anno 1701: "Hæc ſcripta optima ſunt et perfecta, ſive legas Diſſertationem de Motu Sanguinis per Pulmones, ſive alia opuſcula, ſive ultimum tractatum de Opio." *Methodus ſtudii, ab Hallero edita*, p. 569.

(B) He had been married before to a daughter of Colonel James Hay of Pitfour, by whom he had a ſon and daughter, who both died young.

(C) Vide *Pitcarnii Poemata.*—Several of his poems, however, are obſcure, and ſome of them totally unintelligible without a key. In thoſe of them which are of a political kind, he wiſhed not to expreſs himſelf too clearly; and in others, he alludes to private occurrences which were not known beyond the circle of his companions. His poem (*Ad Lindeſium*), addreſſed to his friend Lindſey, is commented on by the authors of the *Biographia Britannica*; and it is to be regretted that it is the only one on which they have been ſolicitous to throw light.

exerted in the cure of diſeaſe, ſtill operate to the good of poſterity.

The diſcovery of the circulation, while in ſome meaſure it exploded the chemical and Galenical doctrines, tended to introduce mathematical and mechanical reaſoning in their ſtead. Of this theory (D) Dr Pitcairne was the principal ſupport, and the firſt who introduced it into Britain. A mathematical turn of mind, and a wiſh for mathematical certainty in medicine, biaſſed him in its favour, and he puſhed it to its utmoſt extent. One is at a loſs whether moſt to admire or regret ſuch a waſte of talents in propping a theory which, though ſubverting of former ones, was to fall before others not a little more conſiſtent than itſelf. Mechanical phyſicians expected more from geometry than that ſcience could grant. They made it the foundation inſtead of an aſſiſtant to their inquiries, and applied it to parts of nature not admitting mathematical calculations. By paying more attention afterwards to the ſupreme influence of the living principle, the ſource of all the motions and functions of the body, it was found that theſe could not be explained by any laws of chemiſtry or mechaniſm. They are ſtill, however, involved in obſcurity; and notwithſtanding the numberleſs improvements which have taken place in the ſciences connected with medicine, will perhaps remain inſcrutable while man continues in his preſent ſtage of exiſtence.

In a ſcience ſo ſlowly progreſſive as that of [illegible] medicine, Dr Pitcairne did a great deal. By labouring in vain for truth in one road, he ſaved many the ſame drudgery, and thereby ſhowed the neceſſity of another. He not only exploded many falſe notions of the chemiſts and Galeniſts which prevailed in his time, but many of thoſe too of his own ſect. In particular, he ſhowed the abſurdity of aſcribing all diſeaſes and their cures to an alkali or an acid (E). He refuted the idea of ſecretion being performed by pores differently ſhaped (F), [illegible] with the blood, [illegible] the blood [illegible] (G). He proved the continuity of the arteries and veins (H), and ſeems to have been the firſt who ſhowed that the [illegible] (I). In this theory he [illegible] moving the blood. He introduced a ſimplicity of preſcription unknown in pharmacy before his time (K); and ſuch was the ſtate of medicine in this country, that ſcarcely have the works of any cotemporary or preceding author been deemed worthy even of preſervation (L). As to the errors of his philoſophy, let it be remembered, that no theory has as yet ſtood the teſt of many years in an enlightened period. His own theory was looſely

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[illegible] "Some parts (ſay they) of this poem, are hardly intelligible, without knowing a circumſtance in the doctor's life, which he often told, and never without ſome emotion. It is a well known ſtory of the two Platonic philoſophers, who promiſed one another, that whichever died firſt ſhould make a viſit to his ſurviving companion. This ſtory being read by Mr Lindſey and our author together, they being both then very young, entered into the ſame engagement. Soon after, Pitcairne, at his father's houſe in Fife, dreamed one morning that Lindſey, who was then at Paris, came to him, and told him he was not dead, as was commonly reported, but ſtill alive, and lived in a very agreeable place, to which he could not yet carry him. By the courſe of the poſt news came of Lindſey's death, which happened very ſuddenly the morning of the dream. When this is known, the poem is eaſily underſtood, and ſhines with no common degree of beauty.

"Lyndeſi! Stygias jamdudum vecte per undas,
"Stagnaque Cocyti non adeunda mihi;
"Excute paulisper Lethæi vincula ſomni,
"Ut feriant animum carmina noſtra tuum.
"Te nobis, te redde tuis, promiſſa daturus
"Gaudia; ſed proavo ſis comitante redux:
"Namque novos viros mutataque regna videbis,
'Paſſaque Teutonicas ſceptra Britanna manus *.

* Written [illegible]

"He then proceeds to exclaim againſt the principles and practices which [illegible] this Teutonic [illegible] upon the Britiſh ſceptre; and concludes with a wiſh, that Lindſey might bring Rhadamanthus with him to puniſh them.

"Unus abeſt ſcelerum vindex Rhadamanthus; amice,
"Dii faciant reditus ſit comes ille tui.

"Every one ſees how much keener an edge is given to the ſatire upon the Revolution, by making it an additional reaſon for his friend's keeping his promiſe to return him a viſit after his death."

(D) See the article PHYSIOLOGY.

(E) *Pitcairne Diſſertationes*, Lugd. edit. 1713. De opera quam præſtant corpora acida vel alkalica in curatione morborum.

(F) De circulatione ſanguinis per vaſa minima.

(G) De diverſa mole qua ſanguis fluit per pulmones.

(H) De circulatione ſanguinis per vaſa minima.

(I) De circulatione ſanguinis in animalibus genitis et non genitis.

(K) *Elementa Medicinæ*, lib. i. cap. [illegible] et paſſim.

(L) The firſt medical publication which diſtinguiſhed this country, after Dr Pitcairne's, was that of the Edinburgh Medical Eſſays, in the year 1732. Vid. the article MONRO.

looſely about him (M); and the preſent generally received practice differs from his very little in reality. He treated inflammatory and hemorrhagic diſeaſes by bleeding, purging, and bliſtering, as has been done uniformly and ſolely on the different theories ſince. His method of adminiſtering mercury and the bark is obſerved at this day; and with reſpect to febrile, nervous, glandular, and dropſical affections, they ſeem to be as often the opprobriums of the art now as they were then.

Dr Pitcairne was univerſally conſidered as the firſt phyſician of his time. No one appears ever to have had ſo much practice in this country, or ſo many conſultations from abroad; and no one, from all accounts, ever practiſed with greater ſagacity and ſucceſs. The higheſt thought themſelves honoured by his acquaintance, and the loweſt were never denied his aſſiſtance and advice. The emoluments of his profeſſion muſt have been great; but his charities are known to have been correſpondent. The poſſeſſion of money he poſtponed to more liberal objects; he collected one of the fineſt private libraries in the world; which was purchaſed, after his death, by the Czar of Muſcovy. Notwithſtanding the fatigues he underwent in the exerciſe of his profeſſion, his conſtitution was naturally delicate. About the beginning of October 1713, he became affected with his laſt illneſs; and on the 23d he died, regretted by ſcience as its ornament, by his country as its boaſt, and by humanity as its friend. He left a ſon and four daughters: of whom only one of the latter now ſurvives. The preſent noble family of Kelly are his grandchildren.

Some anonymous publications are attributed to Dr Pitcairne, particularly a treatiſe *De Legibus Hiſtoriæ Naturalis*, &c.; but the only ones he thought proper to legitimate are his *Diſſertationes Medicæ*, and a ſhort eſſay *De Salute*.

PITCAITHLY. See Pitkeathly.

PITCH, a tenacious oily ſubſtance, drawn chiefly from pines and firs, and uſed in ſhipping, medicine, and various arts: or it is more properly tar inſpiſſated by boiling it over a ſlow fire. See Tar.

Foſſil Pitch. See Petroleum, Mineralogy *Index*.

PITCHING, in ſea-affairs, may be defined the vertical vibration which the length of a ſhip makes about her centre of gravity; or the movement by which ſhe plunges her head and after-part alternately into the hollow of the ſea. This motion may proceed from two cauſes: the waves which agitate the veſſel; and the wind upon the ſails, which makes her ſtoop to every blaſt thereof. The firſt abſolutely depends upon the agitation of the ſea, and is not ſuſceptible of inquiry; and the ſecond is occaſioned by the inclination of the maſts, and may be ſubmitted to certain eſtabliſhed maxims.

When the wind acts upon the ſails, the maſt yields to its effort, with an inclination which increaſes in proportion to the length of the maſt, to the augmentation of the wind, and to the comparative weight and diſtribution of the ſhip's lading.

The repulſion of the water, to the effort of gravity, oppoſes itſelf to this inclination, or at leaſt ſuſtains it, by as much as the repulſion exceeds the momentum, or abſolute effort of the maſt, upon which the wind operates. At the end of each blaſt, when the wind ſuſpends its action, this repulſion lifts the veſſel; and theſe ſucceſſive inclinations and repulſions produce the movement of pitching, which is very inconvenient; and, when it is conſiderable, will greatly retard the courſe, as well as endanger the maſt, and ſtrain the veſſel.

PITH, in vegetation, the ſoft ſpongy ſubſtance contained in the central parts of plants and trees *.

* See *Plant.*

PITHO, in fabulous hiſtory, the goddeſs of perſuaſion among the Romans. She was ſuppoſed to be the daughter of Mercury and Venus, and was repreſented with a diadem on her head, to intimate her influence over the hearts of man. One of her arms appeared raiſed as in the attitude of on orator haranguing in a public aſſembly; and with the other ſhe holds a thunderbolt and fetters, made with flowers, to ſignify the powers of reaſoning and the attractions of eloquence. A caduceus, as a ſymbol of perſuaſion, appears at her feet, with the writings of Demoſthenes and Cicero, the two moſt celebrated among the ancients, who underſtood how to command the attention of their audience, and to rouſe and animate their various paſſions.—A Roman courtezan. She received this name on account of the allurements which her charms poſſeſſed, and of her winning expreſſions.

PITHOM, one of the cities that the children of Iſrael built for Pharaoh in Egypt (Exod. i. 11.) during the time of their ſervitude. This is probably the ſame city with Pathumos mentioned by Herodotus, which he places upon the canal made by the kings Necho and Darius to join the Red ſea with the Nile, and by that means with the Mediterranean. We find alſo in the ancient geographers, that there was an arm of the Nile called *Pathmeticus*, *Phatmicus*, *Phatnicus*, or *Phatniticus*. Bochart ſays, that Pithom and Raamſes are about five leagues above the diviſion of the Nile, and beyond this river; but this aſſertion has no proof from antiquity. This author contents himſelf with relating what was ſaid of Egypt in his own time. Marſham will have Pithom to be the ſame as Peluſium or Damietta.

PITHOU or Pithoeus, *Peter*, a Frenchman of great literary eminence, was deſcended from an ancient and noble family in Normandy, and born at Troyes in 1539. His taſte for literature appeared very early, and his father cultivated it to the utmoſt. He firſt ſtudied at Troyes, and was afterwards ſent to Paris, where he became firſt the ſcholar, and then the friend, of Turnebus. Having finiſhed his purſuits in languages and the belles lettres, he was removed to Bourges, and placed under Cujacius in order to ſtudy civil law. His father was well ſkilled in this profeſſion, and has left no inconſiderable

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(M) Patet *(ſays he)* medicinam eſſe memoriam eorum quæ cuilibet morbo uſus oſtendit fuiſſe utilia. Nam notas non eſſe corporum intra venas fluentium aut conſiſtentium naturas, adeoque ſola obſervatione innoteſcere quid cuique morbo conveniat poſtquam ſæpius eadem eidem morbo profuiſſe comperimus. *De Div. Morb.*

inconſiderable ſpecimen of his judgement in the advice he gave his ſon with regard to acquiring a knowledge of it; which was, not to ſpend his time and pains upon voluminous and barren commentators, but to confine his reading chiefly to original writers. He made ſo rapid a progreſs, that at ſeventeen he was able to ſpeak extempore upon the moſt difficult queſtions; and his maſter was not aſhamed to own, that even himſelf had learned ſome things of him. Cujacius afterwards removed to Valence; and Pithœus followed him, and continued to profit by his lectures till the year 1560. He then returned to Paris, and frequented the bar of the parliament there, in order to join practical forms and uſages to his theoretic knowledge.

In 1563, being then 24, he publiſhed *Adverſaria Subſeciva*, a work highly applauded by Turnebus, Lipſius, and other learned men; and which laid the foundation of that great and extenſive fame he afterwards acquired. Soon after this, Henry III. advanced him to ſome conſiderable poſts; in which, as well as at the bar, he acquitted himſelf moſt honourably. Pithœus being a Proteſtant, it was next to a miracle that he was not involved in the terrible maſſacre of St Bartholomew in 1572; for he was at Paris where it was committed, and in the ſame lodgings with ſeveral Huguenots, who were all killed. It ſeems indeed to have frightened him out of his religion; which having, according to the cuſtom of converts, examined and found to be erroneous, he ſoon abjured, and openly embraced the Catholic faith. He afterwards attended the duke of Montmorency into England; and on his return, from his great wiſdom, good nature, and amiable manners, he became a kind of oracle to his countrymen, and even to foreigners, who conſulted him on all important occaſions; and inſtance of which we have in Ferdinand the grand duke of Tuſcany, who not only conſulted him, but even ſubmitted to his determination in a point contrary to his intereſts. Henry III. and IV. were greatly obliged to him for combating the League in the moſt intrepid manner, and for many other ſervices, in which he had recourſe to his pen as well as to other means.

Pithœus died upon his birth-day in 1596, leaving behind him a wife whom he had married in 1579, and ſome children. Thuanus ſays he was the moſt excellent and accompliſhed man of the age in which he lived; and all the learned have agreed to ſpeak well of him. He collected a very valuable library, containing a variety of rare manuſcripts, as well as printed books; and he took many precautions to hinder its being diſperſed after his death, but in vain. He publiſhed a great number of works upon law, hiſtory, and claſſical literature; and he gave ſeveral new and correct editions of ancient writers. He was the firſt who made the world acquainted with the Fables of Phædrus: which, together with the name of their author, were utterly unknown and unheard of, till publiſhed from a manuſcript of his.

PITISCUS, Samuel, a learned antiquary, was born at Zutphen, and was rector of the college of that city, and afterwards of St Jerome at Utrecht, where he died on the firſt of February 1717, aged 90. He wrote, 1. *Lexicon Antiquitatum Romanarum*, in two volumes folio; a work which is eſteemed. 2. Editions of many Latin authors, with notes; and other works.

PITKEATHLY, or Pitcaithly, is the name of an eſtate in Strathern in Scotland, famous for its mineral waters. An intelligent traveller * gives the following account of it. "The ſituation of the mineral ſpring at Pitcaithly, the efficacy with which its waters are ſaid to operate in the cure of the diſeaſes for which they are uſed, and the accommodations which the neighbourhood affords, are all of a nature to invite equally the ſick and the healthy. Two or three houſes are kept in the ſtyle of hotels for the reception of ſtrangers. There is no long-room at the well; but there are pleaſing walks through the adjoining fields. Good roads afford eaſy acceſs to all the circumjacent country. This delightful tract of Lower Strathern is filled with houſes and gardens, and ſtations from which wide and delightful proſpects may be enjoyed; all of which offer agreeable points to which the company at the well may direct their forenoon excurſions; converſation, muſic, dances, whiſt, and that beſt friend to elegant, lively, and ſocial converſe, the tea-table, are ſufficient to prevent the afternoons from becoming languid: and in the evenings nothing can be ſo delightful as a walk when the ſetting ſun ſheds a ſoft ſlanting light, and the dew has juſt not begun to moiſten the graſs.—Thus is Pitcaithly truly a rural watering-place. The company cannot be at any one time more in number than two or three families. The amuſements of the place are ſimply ſuch as a ſingle family might enjoy in an agreeable ſituation in the country; only the ſociety is more diverſified by the continual change and fluctuation of the company." The waters of this place are of a ſulphureous nature.

PITOT, Henry, of a noble family in Languedoc, was born at Aramont in the dioceſe of Uſez, on the 29th of May 1695, and died there on the 27th of December 1771, aged 76. He learned the mathematics without a maſter, and went to Paris in 1718, where he formed a cloſe friendſhip with the illuſtrious Reaumur. In 1724, he was admitted a member of the Royal Academy of Sciences at Paris, and in a few years roſe to the degree of a penſioner. Beſides a vaſt number of Memoirs printed in the collection of that ſociety, he publiſhed in 1731 the Theory of the Working of Ships, in one volume 4to; a work of conſiderable merit, which was tranſlated into Engliſh, and made the author be admitted into the Royal Society of London. In 1740, the ſtates-general of Languedoc made choice of him for their chief engineer, and gave him at the ſame time the appointment of inſpector general of the canal which unites the two ſeas. That province is indebted to him for ſeveral monuments of his genius, which will tranſmit his name with luſtre to poſterity. The city of Montpellier being in want of water, Pitot brought from the diſtance of three leagues the water of two ſprings which furniſh a plentiful ſupply of that neceſſary article. They are brought to the magnificent Place du Peyron, and thence are diſtributed through the city. This aſtoniſhing work is the admiration of all ſtrangers. The illuſtrious marſhal de Saxe was the great patron and friend of Pitot, who had taught this hero the mathematics. In 1754 he was honoured with the order of St Michael. In 1735 he had married Marie Leonina Pharamondier de Sabballoua, deſcended of a very ancient noble family of Navarre. By this marriage he had only one ſon, who was firſt advocate general of the court of accounts,

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* Heron's Journey through the Weſtern Counties of Scotland.

aids, and finances of Montpellier. Pitot was a practical philoſopher, and a man of uncommon probity and candour. He was alſo a member of the Royal Society of Sciences of Montpellier; and his eulogium was pronounced in 1772 by M. de Ratte perpetual ſecretary, in preſence of the ſtates of Languedoc; as it likewiſe was at the Royal Academy of Sciences of Paris by Abbé de Fouchi, who was then ſecretary.

PITS, John, the biographer, was born in 1560, at Aulton in Hampſhire, and educated at Wykeham's ſchool, near Wincheſter, till he was about 18 years of age; when he was ſent to New-college in Oxford, and admitted probationer fellow. Having continued in that univerſity not quite two years, he left the kingdom as a voluntary Romiſh exile, and retired to Douay; thence he went to the Engliſh college at Rheims, where he remained about a year; and then proceeded to Rome, where he continued a member of the Engliſh college near ſeven years, and was made a prieſt. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and the Greek language. He now quitted Rheims on account of the civil war in France; and retired to Pont à Mouſſon in Lorrain, where he took the degrees of maſter of arts and bachelor in divinity. Hence he travelled into Germany, and reſided a year and a half at Triers, where he commenced licentiate in his faculty. From Triers he viſited ſeveral of the principal cities in Germany; and continuing three years at Ingoldſtadt in Bavaria, took the degree of doctor in divinity. Thence having made the tour of Italy, he returned once more to Lorrain; where he was patroniſed by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after he became confeſſor to the ducheſs of Cleves, daughter to the duke of Lorrain. During the leiſure he enjoyed in this employment, he wrote in Latin the lives of the kings, biſhops, apoſtolical men, and writers of England. The laſt of theſe, commonly known and quoted by this title, *De illuſtribus Angliæ ſcriptoribus*, was publiſhed after his death. The three firſt remain ſtill in manuſcript among the archives of the collegiate church of Liverdun. The duke of Cleves dying after Pits had been about twelve years confeſſor to the ducheſs, ſhe returned to Lorrain, attended by our author, who was promoted to the deanery of Liverdun, which, with a canonry and officialſhip, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. Pits was undoubtedly a ſcholar, and not an inelegant writer; but he is juſtly accuſed of ingratitude to Bale, from whom he borrowed his materials, without acknowledgment. He quotes Leland with great familiarity, without ever having ſeen his book: his errors are innumerable, and his partiality to the Romiſh writers moſt obvious; nevertheleſs we are obliged to him for his account of ſeveral popiſh authors, who lived abroad at the beginning of the Reformation.

PITT, Christopher, an eminent Engliſh poet, celebrated for his excellent tranſlation of Virgil's Æneid, was born in the year 1699. Having ſtudied four years at New-college, Oxford, he was preſented to the living of Pimperne in Dorſetſhire, which he held during the remainder of his life. He had ſo poetical a turn, that while he was a ſchool-boy he wrote two large folios of manuſcript poems, one of which contained an entire tranſlation of Lucan. He was much eſteemed while at the univerſity; particularly by the celebrated Dr Young, who uſed familiarly to call him his *ſon*. Next to his fine tranſlation of Virgil, Mr Pitt gained the greateſt reputation by his excellent Engliſh tranſlation of Vida's Art of Poetry. This amiable poet died in the year 1748, without leaving, it is ſaid, one enemy behind him.

Pitt, *William*, earl of Chatham, a moſt celebrated Britiſh ſtateſman and patriot, was born in November 1708. He was the youngeſt ſon of Robert Pitt, Eſq; of Boconnock in Cornwall; and grandſon of Thomas Pitt, Eſq; governor of Fort St George in the Eaſt Indies, in the reign of Queen Anne, who ſold an extraordinary diamond to the king of France for 135,000 l. and thus obtained the name of *Diamond Pitt*. His intellectual faculties and powers of elocution very ſoon made a diſtinguiſhed appearance; but at the age of 16 he felt the attacks of an hereditary and incurable gout, by which he was tormented at times during the reſt of his life.

His lordſhip entered early into the army, and ſerved in a regiment of dragoons. Through the intereſt of the ducheſs of Marlborough he obtained a ſeat in parliament before he was 21 years of age. His firſt appearance in the houſe was as repreſentative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the 10th he repreſented Seaford, Aldborough in the 11th, and the city of Bath in the 12th; where he continued till he was called up to the houſe of peers in 1766. The intention of the ducheſs in bringing him thus early into parliament was to oppoſe Sir Robert Walpole, whom he kept in awe by the force of his eloquence. At her death the ducheſs left him 10,000 l. on condition, as was then reported, that he never ſhould receive a place in adminiſtration. However, if any ſuch condition was made, it certainly was not kept on his lordſhip's part. In 1746 he was appointed vice-treaſurer of Ireland, and ſoon after paymaſter general of the forces, and ſworn a privy-counſellor. He diſcharged the office of paymaſter with ſuch honour and inflexible integrity, refuſing even many of the perquiſites of his office, that his bittereſt enemies could lay nothing to his charge, and he ſoon became the darling of the people. In 1755 he reſigned the office of paymaſter, on ſeeing Mr Fox preferred to him. The people were alarmed at this reſignation; and being diſguſted with the unſucceſsful beginning of the war, complained ſo loudly, that, on the 4th December 1756, Mr Pitt was appointed ſecretary of ſtate in the room of Mr Fox afterwards Lord Holland; and other promotions were made in order to ſecond his plans. He then took ſuch meaſures as were neceſſary for the honour and intereſt of the nation; but in the month of February 1757, having refuſed to aſſent to the carrying on a war in Germany for the ſake of his majeſty's dominions on the continent, he was deprived of the ſeals on the 5th of April following. Upon this the complaints of the people again became ſo violent, that on the 29th of June he was again appointed ſecretary, and his friends filled other important offices. The ſucceſs with which the war was now conducted is univerſally known; yet on the 5th of October 1761, Mr Pitt, to the aſtoniſhment of almoſt the whole kingdom, reſigned the ſeals into his majeſty's own hands. The reaſon of this was, that Mr

Pitt, having received certain intelligence that the family-compact was ſigned between France and Spain, and that the latter was about to join France againſt us, thought it neceſſary to prevent her by commencing hoſtilities firſt. Having communicated this opinion in the privy-council, the other miniſters urged that they would think twice before they declared war againſt that kingdom. "I will not give them leave to think (replied Mr Pitt); this is the time, let us cruſh the whole houſe of Bourbon. But if the members of this board are of a different opinion, this is the laſt time I ſhall ever mix in its councils. I was called into the miniſtry by the voice of the people, and to them I hold myſelf anſwerable for my conduct. I am to thank the miniſters of the late king for their ſupport; I have ſerved my country with ſucceſs; but I will not be reſponſible for the conduct of the war any longer than while I have the direction of it." To this bold declaration, the lord who then preſided in council made the following reply. "I find the gentleman is determined to leave us; nor can I ſay that I am ſorry for it, ſince he would otherwiſe have certainly compelled us to leave him. But if he is reſolved to aſſume the right of adviſing his majeſty, and directing the operations of the war, to what purpoſe are we called to this council? When he talks of being reſponſible to the people, he talks the language of the houſe of commons, and forgets that at this board he is reſponſible only to the king. However, though he may poſſibly have convinced himſelf of his infallibility, ſtill it remains that we ſhould be equally convinced before we can reſign our underſtandings to his direction, or join with him in the meaſure he propoſes."

This converſation, which was followed by Mr Pitt's reſignation, is ſufficient to ſhow the haughtineſs and imperious temper of our miniſter. However, theſe very qualities were ſometimes productive of great and good conſequences, as appears from the following anecdote.—Preparatory to one of the ſecret expeditions during the war which ended in 1763 the miniſter had given orders to the different preſiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ſhips, and a proportionable quantity of ſtores, &c. and to have them all ready againſt a certain day. To theſe orders he received an anſwer from each of the officers, declaring the total impoſſibility of a compliance with them. Notwithſtanding it was then at a very late hour, he ſent immediately for his ſecretary; and after expreſſing his reſentment at the ignorance or negligence of his majeſty's ſervants, he gave the following commands:—"I deſire, Mr Wood, that you will immediately go to Lord Anſon; you need not trouble yourſelf to ſearch the admiralty, he is not to be found there; you muſt purſue him to the gaming-houſe, and tell him from me, that if he does not obey the orders of government which he has received at my hands, that I will moſt aſſuredly impeach him. Proceed from him to Lord Ligonier; and though he ſhould be bolſtered with harlots, undraw his curtains, and repeat the ſame meſſage. Then direct your courſe to Sir Charles Frederick, and aſſure him that if his majeſty's orders are not obeyed, they ſhall be the laſt which he ſhall receive from me." In conſequence of theſe commands, Mr Wood proceeded to White's, and told his errand to the firſt lord of the admiralty; who inſiſted that the ſecretary of ſtate was out of his ſenſes, and it was impoſſible to comply with his wiſhes: "however, (added he), as madmen muſt be anſwered, tell him that I will do my utmoſt to ſatisfy him." From thence he went to the commander in chief of the forces, and delivered the ſame meſſage. He alſo ſaid that it was an impoſſible buſineſs; "and the ſecretary knows it, (added the old lord): nevertheleſs, he is in the right to make us do what we can; and what it is poſſible to do, inform him, ſhall be done." The ſurveyor general of the ordnance was next informed of Mr Pitt's reſolution; and, after ſome little conſideration, he began to think that the orders might be completed within the time preſcribed. The conſequence at laſt was, that every thing, in ſpite of impoſſibilities themſelves, was ready at the time appointed.

After his reſignation in 1761, Mr Pitt never had any ſhare in adminiſtration. He received a penſion of 3000l. a-year, to be continued after his deceaſe, during the ſurvivancy of his lady and ſon; and this gratuity was dignified with the title of *Baroneſs of Chatham* to his lady, and that of *Baron* to her heirs male. Mr Pitt at that time declined the title of nobility; but in 1766 accepted of a peerage under the title of *Baron Pynſent and Earl of Chatham*, and at the ſame time he was appointed lord privy ſeal.

This acceptance of a peerage proved very prejudicial to his lordſhip's character. However, he continued ſtedfaſt in his oppoſition to the meaſures of adminiſtration. His laſt appearance in the houſe of lords was on the 2d of April 1778. He was then very ill and much debilitated: but the queſtion was important, being a motion of the duke of Richmond to addreſs his majeſty to remove the miniſters, and make peace with America on any terms. His lordſhip made a long ſpeech, which had certainly overcome his ſpirits: for, attempting to riſe a ſecond time, he fell down in a convulſive fit; and though he recovered for that time, his diſorder continued to increaſe till the 11th of May, when he died at his ſeat at Hayes. His death was lamented as a national loſs. As ſoon as the news reached the houſe of commons, which was then ſitting, Colonel Barré made a motion, that an addreſs ſhould be preſented to his majeſty, requeſting that the earl of Chatham ſhould be buried at the public expence. But Mr Rigby having propoſed the erecting of a ſtatue to his memory, as more likely to perpetuate the ſenſe of his great merits entertained by the public, this was unanimouſly carried. A bill was ſoon after paſſed, by which 4000l. a-year was ſettled upon John now earl of Chatham, and the heirs of the late earl to whom that title may deſcend.—His lordſhip was married in 1754 to Lady Heſter, ſiſter to the earl of Temple; by whom he had three ſons and two daughters.

Never perhaps was any life ſo multifarious as that of Lord Chatham: never did any compriſe ſuch a number of intereſting ſituations. To bring the ſcattered features of ſuch a character into one point of view, is an arduous taſk. The author of the hiſtory of his life * has attempted to do it; and with the outlines of what he has ſaid in ſumming up his character, we ſhall finiſh our biographical ſketch of this wonderful man.

"One of the firſt things that ſtrikes us, in the recollection of Chatham's life, is the ſuperior figure he makes among his cotemporaries. Men of genius and attraction, a Carteret, a Townſhend, and I had almoſt

* [illegible]

ſaid a Mansfield, however pleaſing in a limited view, appear evidently in this compariſon to ſhrink into narrower dimenſions, and walk a humbler circle. All that deſerves to arreſt the attention, in taking a general ſurvey of the age in which he lived, is compriſed in the hiſtory of Chatham. No character ever bore the more undiſputed ſtamp of originality. Unreſembled and himſelf, he was not born to accommodate to the genius of his age. While all round him were depreſſed by the uniformity of faſhion, or the contagion of venality, he ſtood aloof. He conſulted no judgement but his own; and he acted from the untainted dictates of a comprehenſive ſoul.

"The native royalty of his mind is eminently conſpicuous. He felt himſelf born to command; and the free ſons of Britain implicitly obeyed him. In him was realized the fable of Orpheus; and his genius, his ſpirit, his eloquence, led millions in his train, ſubdued the rugged ſavage, and diſarmed the fangs of malignity and envy. Nothing is in its nature ſo inconſiſtent as the breath of popular applauſe: and yet that breath was eminently his during the greater part of his life. Want of ſucceſs could not divert it; inconſiſtency of conduct could not change its tenor. The aſtoniſhing extent of his views, and the myſterious comprehenſion of his plans, did not in one reſpect ſet him above little things: nothing that was neceſſary to the execution of his deſigns was beneath him. In another reſpect, however, he was infinitely eſtranged to little things: ſwallowed up in the buſineſs of his country, he did not think of the derangement of his own private affairs; for, though indiſpoſed to all the modes of diſſipated expence, his affairs, even when his circumſtances were much improved, were always deranged. But the features that ſeem moſt eminently to have characterized him, were ſpirit and intrepidity: they are conſpicuous in every action and in every turn of his life; nor did this ſpirit and intrepidity leave him even at the laſt.

"The manners of Lord Chatham were eaſy and bland, his converſation was ſpirited and gay, and he readily adapted himſelf to the complexion of thoſe with whom he aſſociated. That artificial reſerve, which is the never-failing refuge of ſelf-diffidence and cowardice, was not made for him. He was unconſtrained as artleſs infancy, and generous as the noon-day ſun: yet had he ſomething impenetrable that hung about him. By an irreſiſtible energy of ſoul, he was haughty and imperious. He was incapable of aſſociating councils, and he was not formed for the ſweeteſt bands of ſociety. He was a pleaſing companion, but an unpliant friend.

"The ambition of our hero, however generous in its ſtrain, was the ſource of repeated errors in his conduct. To the reſignation of Lord Carteret, and again, from the commencement of the year 1770, his proceedings were bold and uniform. In the intermediate period they were marked with a verſatility, incident only in general to the moſt flexible minds. We may occaſionally trace in them the indeciſion of a candidate, and the ſuppleneſs of a courtier. In a word, he aimed at the impoſſible taſk of flattering at once the prejudices of a monarch, and purſuing unremittedly the intereſts of the people.

"A feature, too, ſufficiently prominent in his character, was vanity, or perhaps pride and conſcious ſuperiority. He dealt ſurely ſomewhat too freely with invective. He did not pretend to an ignorance of his talents, or to manage the diſplay of his important ſervices. Himſelf was too often the hero of his tale; and the ſucceſſes of the laſt war the burden of his ſong †.

"Patriotiſm was alſo the ſource of ſome of his imperfections. He loved his country too well; or, if that may ſound abſurd, the benevolence at leaſt, that embraces the ſpecies, had not ſufficient ſcope in his mind. He once ſtyled himſelf *a lover of honourable war;* and in ſo doing he let us into one trait of his character. The friend of human kind will be an enemy to all war. He indulged too much a puerile antipathy to the houſe of Bourbon: and it was ſurely the want of expanſive affections that led him to ſo unqualified a condemnation of American independency.

"But the eloquence of Lord Chatham was one of his moſt ſtriking characteriſtics. He far outſtripped his competitors, and ſtood alone the rival of antiquity.

"His eloquence was of every kind. No man excelled him in cloſe argument and methodical deduction: but this was not the ſtyle into which he naturally fell. His oratory was unlaboured and ſpontaneous: he ruſhed at once upon the ſubject; and uſually illuſtrated it rather by glowing language and original conception, than by cool reaſoning. His perſon was tall and dignified; his face was the face of an eagle; his piercing eye withered the nerves, and looked through the ſouls of his opponents; his countenance was ſtern, and the voice of thunder ſat upon his lips: anon, however, he could deſcend to the eaſy and the playful. His voice ſeemed ſcarcely more adapted to energy and to terror, than it did to the melodious, the inſinuating, and the ſportive. If, however, in the enthuſiaſm of admiration, we can find room for the frigidity of criticiſm, his action ſeemed the moſt open to objection. It was forcible, uniform, and ungraceful. In a word, the moſt celebrated orators of antiquity were in a great meaſure the children of labour and cultivation. Lord Chatham was always natural and himſelf."

To the misfortune of letters, and of poſterity, it has been ſaid, his lordſhip never publiſhed any thing. Lord Cheſterfield ſays, "that he had a moſt happy turn for poetry: but it is more than probable that Cheſterfield was deceived; for we are told by his biographer that his verſes to Garrick were very meagre, and Lord Chatham himſelf ſaid that he ſeldom indulged and ſeldom avowed it. It ſhould ſeem, then, that he himſelf ſet no great value upon it. Perhaps a proper confidence of one's ſelf is eſſential to all extraordinary merit. Why ſhould we ambitiouſly aſcribe to one mind every ſpecies of human excellence? But though he was no poet, it is more than probable, that he would have excelled as much in writing proſe as he did in ſpeaking it.

PITT, *the Right Honourable William*, was the fourth child of that illuſtrious orator and conſummate ſtateſman, William Pitt, the firſt earl of Chatham, and was born on the 28th of May 1759. Nicholas Pitt, who lived in the reign of Henry VI. was the common anceſtor of the noble families of Chatham, Camelford, and Rivers. Thomas Pitt, the firſt of the name who attained any conſiderable eminence, was governor of Fort St George in the Eaſt Indies, where he purchaſed, as noticed in the preceding life, for 20,400l. ſterling, the extraordinary diamond called the *regent*, weighing 127 carats, and which was ſold to the king of France for the enormous ſum of 135,000l. ſterling. This diamond [illegible] occupies a conſpicuous place in the im[illegible]

[illegible] parts,

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† Ending in 1763.

Bonaparte. By means of this vaſt ſum he was enabled to purchaſe a conſiderable eſtate in Cornwall; yet his grand-children were poorly provided for, particularly the great earl of Chatham, but what he wanted in opulence was abundantly ſupplied by the uncommon talents and abilities, which nature conferred upon him in the profuſeſt manner. Although he betook himſelf for ſupport to the profeſſion of arms, he never roſe higher than to the rank of a cornet of horſe, of which Sir Robert Walpole, with unexampled meanneſs, deprived him, becauſe he had the boldneſs and integrity to oppoſe his adminiſtration. This, however, proved no real obſtacle to his preferment in the ſtate, for in the year 1756 he became prime miniſter.

As the preſent earl of Chatham was deſtined for the army, and another ſon James-Charles for the navy, lord Chatham reſolved to train up William to the profeſſion of a ſtateſman. Having therefore confided the care of his other two ſons to others, he took William under his own immediate inſpection, whoſe rapid progreſs cheered the ſolitude, and illumed the declining days of this extraordinary man, who already began to preſage his future greatneſs. His ſchool exerciſes were performed under the care of a private tutor, a Mr, afterwards Dr Wilſon, while his noble father embraced every opportunity of converſing with him on every intereſting topic with the utmoſt freedom, in order to expand his mind, and mature his judgement. He alſo made him declaim from a chair or a table, well knowing that the gift of eloquence is a valuable acquiſition for a young man who wiſhes to arrive at eminence, and that it had ſupplied the deficiencies of fortune in his own perſon.

It was reſolved on, at a proper period, to ſend William to one of the univerſities, and on this occaſion Cambridge was preferred to Oxford, from a decided opinion entertained by many, that the political doctrines inculcated at the former were more liberal than thoſe uſually propagated at the latter. He was accordingly placed under the tuition of Dr Turner of Pembroke Hall. Dr Prettyman, afterwards biſhop of Lincoln, alſo participated in the care of his education, and was his private inſtructor. During his reſidence at Cambridge, it appears certain that the morals and conduct of Mr Pitt were unimpeachable, not in the ſmalleſt degree contaminated by the powerful example of the young nobility. Here he took his bachelor's degree, and alſo that of A. M. and acquired ſuch reputation in the univerſity for talents, induſtry, and propriety of deportment, as proved of great advantage to him in his ſubſequent purſuits through life.

When Mr Pitt left the univerſity, he was entered at Lincoln's Inn, much about the ſame time with Mr Addington, whoſe father had been both the phyſician and friend of his family, and was enabled to be called to the bar in the ſpace of three years, having received ſome marks of favour on account of his degree. He made choice of the weſtern circuit as the ſcene of his firſt efforts; but having little practice as an lawyer, he had of conſequence but little celebrity; and it is probable that he was ill qualified, on the ſcore of patient and laborious inveſtigation, for a purſuit in which nothing great can be accompliſhed, without the perſevering induſtry of a whole life.

Fortune at this time ſeemed eager to heap favours upon him of another kind. Being bred a ſtateſman, the houſe of commons was of courſe the place where he was to begin his political career. He was adviſed by numerous friends to propoſe himſelf a candidate for the univerſity of Cambridge, but he failed of ſucceſs from the want of ſufficient influence. Accident, however, brought about what the diligence of his friends could not accompliſh. The duke of Rutland aſked Sir James Lowther (afterwards earl of Lonſdale), if he could poſſibly make room in any of his boroughs, to bring in his young friend Mr Pitt, who had thus loſt his election for Cambridge. He was choſen member for the borough of Appleby. About this time the American war was raging with unabated violence, which Mr Pitt, following the example and advice of his father, reprobated as one of the moſt ſhameful and ruinous conflicts of modern times. Having eſpouſed the conſtitutional and popular ſide of this important queſtion, his opening talents were diſplayed to no common advantage, and he was not only regarded as a promiſing ſpeaker, but as deſtined at ſome future period to rank high in the councils of his native country. This was truly honourable to ſo young a man, when it is remembered that one houſe could then boaſt of a Rockingham, a Richmond, and a Shelburne, and the other of a Saville, a Dunning, a Burke, a Barré, and a Fox. Yet there was ſtill room for our juvenile orator, and the recollection of the eloquence, the talents, and the meritorious ſervices of his father, contributed greatly to fix the attention of mankind on the deportment of a favourite ſon.

About this time the extent of the royal prerogative engaged the attention both of the parliament and the public, and a vote of the commons, "that the influence of the crown had increaſed, was increaſing, and ought to be diminiſhed," plainly pointed to an object, whether real or imaginary, which occaſioned a conſiderable degree of diſcontent. Mr Burke, then in the zenith of his popularity, encouraged by numerous ſymptoms of jealouſy, once more brought forward his plan of economy, which being founded on a progreſſive retrenchment, appeared admirably calculated to diminiſh the influence of the crown. It is needleſs to add that it was oppoſed by the miniſter (Lord North), but it was ably ſupported by Mr Pitt, who forcibly ridiculed every objection that could be brought againſt it. The bill was rejected after a long debate, but afterwards introduced at a more auſpicious period, and to a certain extent carried into effect.

Mr Fox having moved that miniſters ſhould immediately take every poſſible meaſure for concluding a peace with our American colonies, he was powerfully ſupported by Mr Pitt, whoſe commanding eloquence engaged the whole attention of the houſe, while he reprobated the cruelty and impolicy of the conteſt with our colonies. He declared that it was conceived in injuſtice, nurtured and brought forth in folly, and its footſteps were marked with blood, ſlaughter, perſecution, and devaſtation. Many handſome compliments were paid him by two eminent judges of real merit, we mean the lord advocate of Scotland (now Viſcount Melville), and Mr Wilkes. The former, in particular, declared that his powerful abilities and brilliant eloquence were univerſally acknowledged proofs, that the [illegible] extent and force of an exalted underſtanding had deſcended, in an hereditary line, from the late [illegible] poſſeſſor of them, to a ſon equally endowed with [illegible], and ſtrength, and grace of oratory.

A more equal repreſentation of the people in parliament was one of the principal objects to which the nation directed its attention, next to the American war. It was admitted to be the undoubted prerogative of the crown to declare war; but as the ſupplies were entruſted to the management of the repreſentatives of the people, it was affirmed by ſome that miniſters could not have carried on a conteſt accompanied with the waſte of ſo much blood and treaſure, had it not been owing to the corruption and venality of parliament. To derive advantage from paſt experience; to confer on the people their due importance in ſuch a mixed government as that of Britain, and reſtore the conſtitution to its original purity, became by this time the grand object of Mr Pitt's exertions. He was as yet untainted by the faſcinating charms of power and authority, and conſidered a well-earned fame as the beſt, the only reward of his laudable endeavours. He accordingly brought the principles and conduct of his opponents to ſuch a teſt as they ſucceſsfully employed againſt himſelf, in order to wound his feelings, and convict him of inconſiſtency, by turning his back on his once favourite ſentiments. When many cities and counties endeavoured to obtain a reform in parliament, Mr Pitt actually ſat in a convention of delegates, met together in the neighbourhood of the place where the legiſlature held its ſittings.

The American war in the mean time was drawing to a termination, and the ſpoils of the office of the former miniſter became the reward of thoſe who oppoſed him. During the ſhort exiſtence of the Rockingham adminiſtration, contractors were excluded from the houſe of commons; officers belonging to the cuſtoms and exciſe were declared unqualified to vote at elections; the proceedings reſpecting the Middleſex election were reſcinded: and while a more liberal policy was adopted with regard to Ireland, many ſuperfluous offices were aboliſhed in England by means of a reform bill, which tended powerfully to deſtroy corruption. Many more important reforms would have been accompliſhed, had not the death of the diſtinguiſhed Rockingham brought about great and ſudden changes.

Mr Fox retired in conſequence of new arrangements, and Lord Shelburne, as firſt lord of the treaſury, made choice of Mr Pitt as chancellor of the exchequer, who, declared, although only 23 years of age, that he would accept of no inferior office. Peace now ſeemed to be an object generally deſirable at any rate, and without much regarding what ſacrifices might be made in order to procure it; but the terms met with powerful oppoſition from two men formerly conſidered as mortal enemies, viz. Lord North and Mr Fox, the latter of whom retired from office. Soon after the diſmiſſion of Mr Fox, Mr Pitt again brought forward the queſtion reſpecting a reform in parliament, which he fondly hoped would be the means of reſtoring him to his wonted popularity, and pave the way to the increaſe of his power. He therefore ſubmitted three different motions to the conſideration of the houſe; but although in theſe motions he was ably ſupported, he was left in a minority.

The coalition miniſtry, as it was called, had ſtill a conſiderable majority in parliament, notwithſtanding the popularity belonging to the name and talents of Mr Pitt, but the celebrated India bill was productive of a change. This bill owed its origin to Mr Burke, but it received a regular and ſyſtematical oppoſition from the ex chancellor of the exchequer. It was carried, however, in the houſe of commons by a great majority, but in the houſe of lords it was oppoſed by the duke of Richmond, Lord Thurlow, and Earl Temple (afterwards marquis of Buckingham); and on the 17th of December 1783, it was finally rejected by a majority of 19.

The king in the mean time determined on an entire change of adminiſtration, and the two ſecretaries were informed on the 18th of December 1783, about 12 o'clock at night, that his majeſty had no further occaſion for their ſervices. In conſequence of this change, the important offices of firſt lord of the treaſury and chancellor of the exchequer were beſtowed on Mr Pitt, who thus became prime miniſter before he was full 24 years of age. Thurlow was created lord chancellor, the duke of Richmond keeper of the privy ſeal; the marquis of Caermarthen and Lord Sidney were choſen ſecretaries of ſtate, and Mr Dundas, treaſurer of the navy.

Much about this time Mr Pitt brought forward a new bill for the better government of India. He propoſed that a board of controul ſhould be inſtituted, the nomination of whoſe members was to be veſted in the crown, and to them the diſpatches of the company were to be ſubmitted. He alſo propoſed that the appointment of the commander in chief ſhould belong to his majeſty, and having thus ſecured the political intereſts of the company, he left thoſe of a commercial nature entirely to the court of directors. This bill, after a ſhort debate, was rejected by a majority of eight. Such was the preſent temper of the houſe of commons, that a coalition or immediate diſſolution became abſolutely neceſſary; and the former having been unſucceſsfully attempted, the latter was ſuddenly adopted, on the 25th of March 1784. Mr Pitt having been returned for the univerſity of Cambridge, again brought forward his bill in an amended ſtate for the regulation of India, and carried it in triumph through both houſes of parliament. The remaining part of the ſeſſion gave birth to an act for the better prevention of ſmuggling, and the commutation act, by virtue of which certain duties were transferred from tea to windows.

When Mr Alderman Sawbridge (June 16th 1784) made a motion for inquiring into the preſent ſtate of the commons of Great Britain in parliament, Mr Pitt, whoſe political ſentiments had undergone a revolution, felt himſelf conſiderably embarraſſed, as he was reminded that he had brought forward queſtions on the ſame ſubject upon a former occaſion. Mr Pitt, however, declined it, on account of the preſſure of public buſineſs, and obſerved that, in his opinion, the preſent was not the proper time for bringing forward the queſtion, and that it might be urged with greater probability of ſucceſs on ſome future occaſion. He did not wiſh it to be diſcuſſed in a precipitate manner, yet the buſineſs itſelf ſhould have every ſupport he was able to afford it.

Having now attained the ſummit of power and influence as prime miniſter, Mr Pitt exerciſed every function of his important office, without any check or controul. Poſſeſſed of a great majority in both houſes of parliament, as well as in the cabinet, his whole deportment, in the language of his opponents, ſeems to have become lofty in the extreme; and he paid little or no regard to that popularity which he had formerly courted.

A commercial treaty about this time was entered into with France, the terms of which have been generally acknowledged to be advantageous to Britain. Mr Pitt, who deserves great credit for giving the plan his countenance, adopted, much about the ſame time, another reſpecting the finances, from which he derived a high degree of reputation; and, as he pointed at a period when the national debt might, in all probability, be extinguiſhed, the country, if it was not altogether ſatisfied, appeared to be at leaſt contented under his adminiſtration: and it is not a little to the credit of his financial ſyſtem, that his opponents, when in power, not only approved, but adopted and extended it.

In this manner a commercial country began again to flouriſh, by turning its attention to the arts of peace; but, during his adminiſtration, its proſperity was threatened to be interrupted by the preparations for an attack upon Ruſſia at one time, and by an open rupture with Spain at another, relative to Nootka ſound. In both caſes the blow was warded off by negociation, and a good underſtanding reſtored. The reſtoration of the ſtadtholder, by the intervention of a Pruſſian army, and the ſtrenuous oppoſition of the prince of Wales's appointment to the regency during the king's indiſpoſition, were alſo two important meaſures paſſed and diſcuſſed in the courſe of his miniſtry.

Soon after the commencement of the French revolution, Mr Pitt deemed a war with that country inevitable. But for a full detail of the events of this war, ſee BRITAIN. Having held the reins of government during 15 years, Mr Pitt, and all the members of the cabinet, ſuddenly retired from office in 1801. On this occaſion all parties appeared to rejoice at the appointment of Mr Addington; and France, from that moment, as ſome aſſert, ſeemed to have neither friends nor advocates in this iſland. When the articles of the treaty of Amiens were debated in the houſe of commons, Mr Pitt defended the new miniſter with the whole force of his abilities and influence.

On the 15th of March 1804, Mr Pitt made a direct attack on the adminiſtration; and the admiralty board was accuſed by him of imbecility. He zealouſly ſupported Mr Fox's propoſition relative to the Iriſh militia bill for the national defence, which was loſt on a diviſion. The miniſter's majority having dwindled to 37, on the army of reſerve ſuſpenſion bill, Mr Addington and ſome of his friends retired, and the ex-miniſter reſumed his former ſeat. When parliament met on the 15th of January 1805, Mr Pitt warmly defended the war with Spain; and, on the motion for an addreſs, he had a majority of 207.

But, in the mean time, a gouty habit, the prediſpoſing cauſes of which appear to have been hereditary, and which, perhaps, was increaſed by his own manner of living, ſeized on a conſtitution never very ſtrong. It is alleged, by his opponents, that this, combined with the miſcarriage of his ſchemes, and the aſpect of affairs on the continent, preyed ſo much upon his mind, that he is ſaid to have died of a broken heart, at his houſe near Putney, between four and five on Wedneſday morning, January 23. 1806, in the 47th year of his age.

As a financier, no man has obtained more praiſe, who ever preſided at the board of exchequer. During his miniſtry ſome of our manufactures languiſhed, but many flouriſhed, and our exports were greatly increaſed. As a ſpeaker he was unrivalled, and his generous contempt of wealth muſt be admired. In 20 years his debts amounted only to 40,000 l. They were paid out of the public purſe. The houſe of commons alſo paſſed a vote, that the expences of his funeral, and a monument to his memory, ſhould be defrayed by the nation.

PITTACUS, a native of Mitylene in Leſbos, was one of the ſeven wiſe men of Greece. His father's name was Hyrrhadius. With the aſſiſtance of the ſons of Alcæus, he delivered his country from the oppreſſion of the tyrant Melanchrus; and in the war which the Athenians waged againſt Leſbos, he appeared at the head of his countrymen, and challenged to ſingle combat Phrynon the enemy's general. As the event of the war ſeemed to depend upon this combat, Pittacus had recourſe to artifice; and when he engaged, he entangled his adverſary in a net which he had concealed under his ſhield, and eaſily diſpatched him. He was amply rewarded for this victory; and his countrymen, ſenſible of his merit, unanimouſly appointed him governor of their city with unlimited authority. In this capacity Pittacus behaved with great moderation and prudence; and after he had governed his fellow-citizens with the ſtricteſt juſtice, and after he had eſtabliſhed and enforced the moſt ſalutary laws, he voluntarily reſigned the ſovereign power after having enjoyed it for 10 years, obſerving that the virtues and innocence of private life were incompatible with the power and influence of a ſovereign. His diſintereſtedneſs gained him many admirers; and when the Mityleneans wiſhed to reward his public ſervices by preſenting him with an immenſe tract of territory, he refuſed to accept more land than what ſhould be contained in the diſtance to which he could throw a javelin. He died in the 70th year of his age, about 579 years before Chriſt, after he had ſpent the laſt 10 years of his life in literary eaſe and peaceful retirement.

The following maxims and precepts are aſcribed to Pittacus: The firſt office of prudence is to foreſee threatening misfortunes, and prevent them. Power diſcovers the man. Never talk of your ſchemes before they are executed; leſt, if you fail to accompliſh them, you be expoſed to the double mortification of diſappointment and ridicule. Whatever you do, do it well. Do not that to your neighbour which you would take ill from him. Be watchful for opportunities.

Many of his maxims were inſcribed on the walls of Apollo's temple at Delphi, to ſhew to the world how great an opinion the Mityleneans entertained of his abilities as a philoſopher, a moraliſt, and a man. By one of his laws, every fault committed by a man when intoxicated deſerved double puniſhment.

PITTENWEEM, a ſmall town ſituated on the frith of Forth, towards the eaſtern extremity of the county of Fife in North Britain. It takes its name from a ſmall cave in the middle of it, anciently called a *weem;* and is remarkable for nothing but the ruins of a religious houſe, which is ſometimes called an *abbey* and ſometimes a *priory*. Which of theſe is the proper denomination it is hardly worth while to inquire; but it appears from the arms of the monaſtery, ſtill preſerved over the principal gate, that the ſuperior, by whatever title he was called, had the privilege of wearing a mitre. The building, which ſeems never to have been large, was, like other monuments of that kind, partly deſtroyed at the Reformation; and what parts of it now remain are put to very different uſes. Some of the cells of the monks furniſh habitations tolerably convenient for the ſervants of him who, in the ceaſeleſs change of property, has got poſſeſſion of the lands which formerly belonged to them. That which ſeems to have been the granary is a decent pariſh church. The porch of the chapel, the only part of that building which exiſts, has been alternately employed as a ſtable and a ſlaughter-houſe; and the meat killed there has been commonly expoſed to ſale in the lower part of the ſteeple of that edifice which is now dedicated to the offices of parochial devotion. Had the moralizing traveller *, who compoſed the beautiful and pathetic meditation on the ruins of *Iona*, condeſcended to viſit Pittenweem, he would not have viewed the abbey without emotion. Inſignificant as the place at preſent is, it ſeems to have been of ſome conſequence in the laſt century; and we are led to infer, from the following extract from the records, that the inhabitants were opulent, and that the town was fortified.

"Pittenweem, decimo quarto Feb. 1651. The bailies and council being convened, and having received information that his majeſty is to be in progreſs with his court along the coaſt to-morrow, and to ſtay at Anſtruther houſe that night, have thought it expedient, according to their bounden duty, with all reverence and due reſpect, and with all the ſame ſolemnity they can, to wait upon his majeſty, as he comes through this his majeſty's burgh, and invite his majeſty to eat and drink as he paſſes; and for that effect hath ordained, that the morn afternoon the town's colours be put upon the bertiſene of the ſteeple, and that at three o'clock the bells begin to ring, and ring on ſtill till his majeſty comes hither, and paſſes to Anſtruther: And ſicklike, that the miniſter be ſpoken to, to be with the bailies and council, who are to be in their beſt apparel, and with them a guard of 24 of the ableſt men, with partizans, and other 24 with muſkets, all in their beſt apparel, William Sutherland commanding as captain of the guard; and to wait upon his majeſty, and to receive his highneſs at the Weſt Port, bringing his majeſty and court through the town, until they come to Robert Smith's yeet, where an table is to be covered with my Lord's * beſt carpet: and that George Hetherwick have in readineſs, of fine flour, ſome great bunns, and other wheat-bread of the beſt order, baken with ſugar, cannell, and other ſpices fitting; and that James Richardſon and Walter Airth have care to have ready eight or ten gallons of good ſtrong ale, with Canary, ſack, Rheniſh wine, tent, white and claret wines, that his majeſty and his court may eat and drink; and that in the mean time, when his majeſty is preſent, the guard do diligently attend about the court; and ſo ſoon as his majeſty is to go away, that a ſign be made to Andrew Tod, who is appointed to attend the colours on the ſteeple head, to the effect he may give ſign to thoſe who attend the cannon of his majeſty's departure, and then the *haill thirty ſix cannons to be all ſhot at once.* It is alſo thought fitting, that the miniſter, and James Richardſon the oldeſt bailie, when his majeſty comes to the table, ſhow the great joy and ſenſe this burgh has of his majeſty's condeſcendence to viſit the ſame, with ſome other expreſſions of loyalty. All which was acted." The population of this town, in 1790, was computed at 1157. N. Lat. 56. 11. W. Long. 2. 49.

* Johnſon.

* The Earl of Kelly.

PITTOSPORUM, a genus of plants belonging to the pentandria claſs. See BOTANY *Index*.

PITUITARY GLAND. See ANATOMY *Index*.

PITYOCAMPASIS, in *Entomology*, the caterpillar of the pine-tree, received its compound name from that ſubſtance. It was conſidered as a poiſon, and as a remedy, according to its different mode of application. Our chief information, concerning this caterpillar, is derived from M. Reaumur, who has attentively obſerved its manner of life. The animal cannot bear much cold, and is therefore never found in the higher latitudes. It is ſtyled proceſſionary, becauſe it never leaves its hold, where many families reſide, till the evening, when it feeds in trains, led on by two or three, and this train leaves a ribband of ſilk in its way; for thoſe behind follow exactly the ſteps of thoſe which preceded, and each leaves its fibre of ſilk. Their neſts are found in autumn; they are produced in the middle of September, become torpid in December, and recover their ſtrength again in ſpring. They then deſcend from the trees, plunge into the earth, and undergo their laſt change. It is the bombix pityocampa of Fabricius, (*Mantiſſa Inſector.* tom. ii. p. 114. Nº 66.), and greatly reſembled the proceſſionary caterpillar of the oak. The ancients uſed it as a veſicatory, and the acrimony ſeems to reſide chiefly in a duſt which is concealed in receptacles on its back. This is its offenſive weapon, for it is thrown out at will, and produces very troubleſome effects, though the hair of the animal and every part of its body ſeem to have a ſimilar, but weaker power. The effect is alſo weaker in winter; but this may depend on the diminiſhed irritability of the human body, as well as on the torpid ſtate of the inſect. Their ſilk is not ſufficiently ſtrong for the loom, and in hot water melts almoſt to a paſte. In the earth it forms neſts of ſtronger ſilk, but it is then found with difficulty: in boxes its ſilk is extremely tender. Adding to all theſe inconveniences, handling the cones produces all the bad effects of the duſt. Matthiolus recommends them as a ſtyptic, and perhaps they may ſerve for burning on the ſkin inſtead of moxa, the downy ſilk of a ſpecies of artemiſia. The ancients, afraid of its hurtful qualities, uſed them with caution, and enacted laws againſt their being ſold promiſcuouſly: the modern planter is chiefly afraid of them, becauſe they deſtroy the beauty of his trees, and he endeavours to collect the eggs by cutting off the branches, which are burnt immediately.

PIVAT, or PIVOT, a foot or ſhoe of iron or other metal, uſually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at reſt, and performs its revolutions. The pivot uſually bears or turns round in a ſole, or piece of iron or braſs hollowed to receive it.

PIUS II. (ÆNEAS-SYLVIUS PICCOLOMINI), was born on the 18th of October 1405, at Corſigni in the Sieneſe, the name of which he afterwards changed into that of *Pienza*. His mother Victoria Forteguerra, when ſhe was with child of him, dreamed that ſhe ſhould be delivered of a mitred infant; and as the way of degrading clergymen at that time was by crowning them with a paper mitre, ſhe believed that Æneas would be a diſgrace to his family. But what to her had the appearance of being a diſgrace, was a preſage of the greateſt honours. Æneas was carefully educated, and made conſiderable proficiency in the belles lettres. After having

ving finiſhed his ſtudies at Sienna, he went in 1431 to the council of Bale with Cardinal Capranica, ſurnamed *De Firmo*, becauſe he was entruſted with the government of that church. Æneas was his ſecretary, and was then only 26 years of age. He afterwards acted in the ſame capacity to ſeveral other prelates, and to Cardinal Albergati. The council of Bale honoured him with different commiſſions, in order to recompenſe him for the zeal with which he defended that aſſembly againſt Pope Eugene IV. He was afterwards ſecretary to Frederic III. who granted to him the poetic crown, and ſent him ambaſſador to Rome, Milan, Naples, Bohemia, and other places. Nicholas V. advanced him to the biſhopric of Trieſte, which he quitted ſome time after for that of Sienna. At laſt, after having diſtinguiſhed himſelf in various nunciatures, he was honoured with the Roman purple by Callixtus III. whom he ſucceeded two years after, on the 27th of Auguſt 1458. Pius II. now advanced to the holy ſee, made good the proverb, *Honores mutant mores.* From the commencement of his pontificate, he appeared jealous of the papal prerogatives. In 1460 he iſſued a bull, "declaring appeals from the pope to a council to be null, erroneous, deteſtable, and contrary to the ſacred canons." That bull, however, did not prevent the procurator-general of the parliament of Paris from appealing to a council in defence of the Pragmatic Sanction, which the pope had ſtrenuouſly oppoſed. Pius was then at Mantua, whither he had gone in order to engage the Catholic princes to unite in a war againſt the Turks. The greater part of them had agreed to furniſh troops or money; others refuſed both, particularly France, which from that moment incurred his holineſs's averſion. That averſion abated under Louis XI. whom he perſuaded in 1461 to aboliſh the Pragmatic Sanction, which the parliament of Paris had ſupported with ſo much vigour.

The following year 1462, was rendered famous by a controverſy which took place between the Cordeliers and Dominicans, whether or not the blood of Jeſus Chriſt was ſeparated from his body while he lay in the grave. It was alſo made a queſtion whether it was ſeparated from his divinity. The Cordeliers affirmed that it was, but the Dominicans were of an oppoſite opinion. They called each other heretics; which obliged the pope to iſſue a bull, forbidding them under pain of cenſure to brand one another with ſuch odious epithets. The bull which his holineſs publiſhed on the 26th of April, retracting what he had written to the council of Bale when he was its ſecretary, did not redound much to his honour. "I am a man (ſays he), and as a man I have erred. I am far from denying that a great many things which I have ſaid and written, may deſerve condemnation. Like Paul, I have preached through deception, and I have perſecuted the church of God through ignorance. I imitate the bleſſed Auguſtin, who having ſuffered ſome erroneous ſentiments to creep into his works, retracted them. I do the ſame thing: I frankly acknowledge my ignorance, from a fear leſt what I have written in my younger years ſhould be the occaſion of any error that might afterwards be prejudicial to the intereſts of the holy ſee. For if it be proper for any one to defend and ſupport the eminence and glory of the firſt throne of the church, it is in a peculiar manner my duty, whom God, out of his mercy and goodneſs alone, without any merit on my part, has raiſed to the dignity of *Vicar of Jeſus Chriſt*. For all theſe reaſons, we exhort and admoniſh you in the Lord, not to give credit to thoſe writings of ours which tend in any degree to hurt the authority of the apoſtolic ſee, and which eſtabliſh opinions that are not received by the Roman church. If you find, then, any thing contrary to her doctrine, either in our dialogues, in our letters, or in other of our works, deſpiſe ſuch opinions, reject them, and adopt our preſent ſentiments. Believe me rather now that I am an old man, than when I addreſſed you in my earlier years. Eſteem a ſovereign pontiff more than a private individual; reject Æneas Sylvius, but receive Pius II." It might be objected to his holineſs, that it was his dignity alone which had made him alter his opinion. He prevents that objection, by giving a ſhort account of his life and actions, with the whole hiſtory of the council of Bale, to which he went with Cardinal Capranica in 1431; "but (ſays he) I was then a young man, and without any experience, like a bird juſt come from its neſt." In the mean time, the Turks were threatening Chriſtendom. Pius, ever zealous in the defence of religion againſt the infidels, forms the reſolution of fitting out a fleet at the expence of the church, and of paſſing over into Aſia himſelf, in order to animate the Chriſtian princes by his example. He repaired to Ancona with a deſign to embark; but he there fell ſick with the fatigue of the journey, and died on the 16th of Auguſt 1464, aged 59 years. Pius was one of the moſt learned men of his time, and one of the moſt zealous pontiffs; but being of an ambitious and proud diſpoſition, he ſometimes ſacrificed to that ambition. His principal works are, 1. Memoirs of the council of Bale, from the ſuſpenſion of Eugenius to the election of Felix. 2. The hiſtory of the Bohemians, from their origin to the year 1458. 3. Two books on coſmography. 4. The hiſtory of Frederic III. whoſe vice-chancellor he had been. This performance was publiſhed in 1785 in folio, and is believed to be pretty accurate and very particular. 5. A treatiſe on the education of children. 6. A poem upon the paſſion of Jeſus Chriſt. 7. A collection of 432 letters, printed at Milan, 1473, in folio, in which are found ſome curious anecdotes. 8. The memoirs of his own life, publiſhed by John Gobelin Perſona his ſecretary, and printed at Rome in 4to in 1584. There is no doubt of this being the genuine production of that pontiff. 9. *Hiſtoria rerum ubique geſtarum*, of which only the firſt part was publiſhed at Venice in 1477 in folio. His works were printed at Helmſtadt in 1700, in folio, at the beginning of which we find his life. That verſe of Virgil (Æneid I. v. 382.) which begins thus,

Sum pius Æneas.———

and the end of the following verſe,

———*fama ſuper æthera notus*,

have been applied to him.

Pius IV. (*John Angelo, Cardinal de Medicis*), of a different family from that of Florence, was born at Milan in 1499. He was ſon to Bernardin de Medicis, and brother of the famous Marquis de Marignan, Charles V.'s general. He raiſed himſelf by his own merit, and filled ſeveral important offices under Pope Clement VII. and Paul III. Julius III. who had entruſted him with ſeveral legations, honoured him with a cardinal's hat in 1549. After the death of Paul IV. he was advanced to St Peter's chair on the 25th of December 1559. His predeceſſor had rendered himſelf deteſtable to the Romans, who treated his memory with every mark of indignity, and Pius IV. commenced his pontificate by pardoning them. He did not, however, extend the ſame clemency to the nephews of Pope Paul IV.; for he cauſed Cardinal Caraffe to be ſtrangled in the caſtle of St Angelo, and his brother, the prince de Palliano, to be beheaded. His zeal was afterwards directed againſt the Turks and heretics. In order to ſtop, if poſſible, the progreſs of theſe laſt, he renewed the Council of Trent, which had been ſuſpended. He knew well (ſays Abbe de Choiſy), that that council might make ſome regulations which would have the effect to leſſen his authority; but, on the other hand, he perceived that great inconveniences might reſult from its not being aſſembled; and "*in the main* (ſaid he to his confidants) *it is better to feel evil for once than to be always in dread of it.*" In 1561 he diſpatched nuncios to all the Catholic and Proteſtant princes, to preſent them with the bull for calling that important aſſembly. An end was, however, put to it by the induſtry of his nephew, S. Charles Borromeus, in 1563; and, on the 26th of January the year following, he iſſued a bull for confirming its decrees. In 1565 a conſpiracy was formed againſt his life by Benedict Acolti, and ſome other viſionaries. Thoſe madmen had taken it into their head that Pius IV. was not a lawful pope, and that after his death they would place another in St Peter's chair, with the title of *Pope Angelicus*, under whom errors might be reformed, and peace reſtored to the church. The conſpiracy was diſcovered, and the fanatic Benedict put to death. This pontiff died a little time after, on the 9th of December 1565, aged 66 years, carrying to the grave with him the hatred of the Romans, whom his ſeverities had exaſperated. He was a man of great addreſs, and very fruitful in his reſources. He adorned Rome with ſeveral public edifices; but theſe ornaments tended greatly to impoveriſh it. If he was the inſtrument of raiſing his relations in the world, it muſt be allowed, at leaſt, that the greater part of them did him honour.

Pius V. (*S. Michael Ghiſleri*), born at Boſchi or Boſco, in the dioceſe of Fortona, on the 17th of January 1504, was, according to Abbé de Choiſy, ſon to a ſenator of Milan. He turned a Dominican friar. Paul IV. informed of his merit and virtue, gave him the biſhopric of Sutri, created him cardinal in 1557, and made him inquiſitor-general of the faith among the Milaneſe and in Lombardy; but the ſeverity with which he exerciſed his office obliged him to quit that country. He was ſent to Venice, where the ardour of his zeal met with ſtill greater obſtacles. Pius IV. added to the cardinal's hat the biſhopric of Mondovi. After the death of that pontiff, he was advanced to St Peter's chair in 1566. The Romans expreſſed but little joy at his coronation: he was very ſenſible of it, and ſaid, "*I hope they will be as ſorry at my death as they are at my election*;" but he was miſtaken. Raiſed by his merit to the firſt eccleſiaſtical preferment in Chriſtendom, he could not diveſt himſelf of the ſeverity of his character; and the ſituation in which he found himſelf rendered, perhaps, that ſeverity neceſſary. One of his firſt objects was to repreſs the luxury of the clergy, the pride of the cardinals, and the licentious manners of the Romans. He cauſed the decrees of reformation enacted by the Council of Trent to be put in execution; he prohibited bull-baiting in the Circus; he expelled from Rome the women of the town; and allowed the cardinals to be proſecuted for their debts. The errors which overflowed the Chriſtian world gave him great uneaſineſs. After having employed gentle and lenient meaſures in the reclaiming of heretics, he had recourſe to ſeverity, and ſome of them ended their days in the flames of the inquiſition. He particularly diſplayed his zeal for the grandeur of the holy ſee in 1568, by ordaining that the bull *In cæna domini*, which was publiſhed at Rome every year on *Maunday Thurſday*, and which Clement XIV. ſuppreſſed, ſhould be publiſhed likewiſe throughout the whole church. That bull, the work of ſeveral ſovereign pontiffs, principally regards the juriſdiction of the eccleſiaſtical and civil power. It anathematizes thoſe who appeal from the decrees of popes to a general council; thoſe who favour the appellants; the univerſities which teach that the pope is ſubject to a general council; the princes who would reſtrain the eccleſiaſtical juriſdiction, or who exact contributions from the clergy. It was rejected by all the ſovereign ſtates, excepting a very few. In 1580, ſome biſhops having endeavoured to introduce it into their dioceſes, the parliament cauſed their temporalities to be ſeized upon, and declared thoſe guilty of high treaſon who ſhould imitate the fanaticiſm of thoſe prelates. Pius V. for ſome time meditated an expedition againſt the Turks. He had the courage to make war on the Ottoman empire, by forming a league with the Venetians and Philip II. king of Spain. This was the firſt time that the ſtandard of the two keys was ſeen diſplayed againſt the creſcent. The naval armies came to an engagement, on the 7th of October 1571, in Lepanto bay, in which the confederate Chriſtian princes obtained a ſignal victory over the Turks, who loſt above 30,000 men, and near 200 galleys. This ſucceſs was principally owing to the pope, who exhauſted both his purſe and perſon in fitting out that armament. He died of the gravel ſix months after, on the 30th of April 1572, aged 68. He repeated often, in the midſt of his ſufferings, "*O Lord! increaſe my pains and my patience.*" His name will for ever adorn the liſt of Roman pontiffs. It is true, that his bull againſt Queen Elizabeth, and his other bull in favour of the inquiſition, with his rigorous proſecution of heretics both in France and Ireland, prove that he had more zeal than ſweetneſs in his temper; but in other reſpects he poſſeſſed the virtues of a ſaint and the qualities of a king. He was the model of the famous Sixtus Quintus, to whom he gave an example of amaſſing in a few years ſuch ſavings as were ſufficient to make the holy ſee be regarded as a formidable power. Sultan Selim, who had no greater enemy than this pope, cauſed public rejoicings to be made at Conſtantinople for his death during the ſpace of three days. The pontificate of Pius is alſo celebrated for the condemnation of Baius, the extinction of the order of Humilies, and the reformation of that of the Ciſtercians. He was canonized by Clement XI. in 1712. There are extant ſeveral of his letters, printed at Anvers in 1640, in 4to. Felibian, in 1672, publiſhed his *Life*, tranſlated from the Italian of Agatio di Somma; but we cannot vouch for the fidelity of the tranſlation.

PIX. See *Mint Marks*.

PIZARRO, Francis, a celebrated Spaniſh general, the diſcoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spaniſh navigator. They are both charged with horrid cruelties to the inhabitants; and they fell victims to their own ambition, jealouſy, and avarice. Almagro revolting, was defeated and beheaded by Pizarro, who was aſſaſſinated by Almagro's friends in 1541. See Peru.

PLACE, Locus, in *Philoſophy*, a mode of ſpace or that part of immoveable ſpace which any body poſſeſſes. See Metaphysics, N° 185.

Place, in *Aſtronomy*. The place of the ſun, a ſtar, &c. denotes the ſign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of Aries, which the planet's or ſtar's circle of longitude cuts: and therefore coincides with the longitude of the ſun, planet, or ſtar. As the ſine of the ſun's greateſt declination 23° 30′ : to the ſine of any preſent declination given or obſerved, for inſtance, 23° 15′ : : ſo is the radius 10 : to the ſine of his longitude 81° 52′; which, if the declination were north, would give 20° 52′ of Gemini; if ſouth, 20° 52′ of Capricorn, for the ſun's place. See Declination, &c.

The place of the moon being that part of her orbit wherein ſhe is found at any time, is of various kinds, by reaſon of the great inequalities of the lunar motions, which render a number of equations and reductions neceſſary before the juſt point be found. The moon's fictitious place is her place once equated; her place nearly true, is her place twice equated; and her true place thrice equated. See Astronomy, *paſſim*.

Place, in *War*, a general name for all kinds of fortreſſes where a party may defend themſelves. Thus, 1. A ſtrong or fortified place is one flanked, and covered with baſtions. 2. A regular place, one whoſe angles, ſides, baſtions, and other parts, are equal; and this is uſually denominated from the number of its angles, as a pentagon, hexagon, &c. 3. Irregular place is one whoſe ſides and angles are unequal.—4. Place of arms is a ſtrong city or town pitched upon for the chief magazine of an army; or, in a city or garriſon, it is a large open ſpot of ground, uſually near the centre of the place where the grand guard is commonly kept, and the garriſon holds its rendezvous at reviews, and in caſes of alarm to receive orders from the governor. 5. Places of arms of an attack, in a ſiege, is a ſpacious place covered from the enemy by a parapet or epaulement, where the ſoldiers are poſted ready to ſuſtain thoſe at work in the trenches againſt the ſoldiers of the garriſon. 6. Place of arms particular, in a garriſon, a place near every baſtion, where the ſoldiers ſent from the grand place to the quarters aſſigned them relieve thoſe that are either upon the guard or in ſight. 7. Place of arms without, is a place allowed to the covert way for the planting of cannon, to obligè thoſe who advance in their approaches to retire. 8. Place of arms in a camp, a large place at the head of the camp for the army to be ranged in and drawn up in battalia. There is alſo a place for each particular body, troop, or company, to aſſemble in.

Common Place. See *Common-Place*.

PLACENTA, in *Anatomy* and *Midwifery*, a ſoft roundiſh maſs, found in the womb of pregnant women; which, from its reſemblance to the liver, was called by the ancients *hepar uterinum*, uterine liver.

PLACENTIA, called by the natives *Piacenza*, a town of Italy, and capital of a duchy of the ſame name, with a biſhop's ſee. It is ſeated about [illegible] paces from the river Po, in a very fertile pleaſant plain, watered by a great number of rivulets, and ſurrounded with hills, abounding in all ſorts of fruits. In its territory there are ſalt-ſprings, from which they make a very white ſalt; and there are alſo mines of iron, woods, and warrens. It contains a great number of merchants, and is reckoned three miles in circumference. Its fortifications are inconſiderable, but the citadel is pretty ſtrong. The ſtreets are ſtraight, and the principal ſtreet called *Stradone*, is 25 common paces broad and 3000 feet long, in a direct line, with 600 ſtone poſts, for ſeparating the foot from the carriage-way, and on both ſides are 11 ſpacious convents. The other buildings of the city are not very remarkable, though it contains 45 churches, 28 convents, and two alms-houſes. The cathedral is pretty much in the Gothic taſte; but the church of the Auguſtines is reckoned the moſt beautiful, and eſteemed worthy of its architect, the celebrated Vignoli. The ducal palace, though large, makes no great appearance externally; but within there are ſome good apartments. In the area before the town-houſe ſtand two admirable braſs ſtatues of Alexander and Renatus IV. both of the houſe of Farneſe, and dukes of Parma and Placentia. The biſhop is ſuffragan to the archbiſhop of Milan. At this city begins the Via Æmilia, which extends as far as Rimini on the Adriatic. The number of the inhabitants is about 30,000, among whom there are 2000 eccleſiaſtics. This city has been taken ſeveral times in the wars of Italy. The king of Sardinia took poſſeſſion of it in 1744, it being ceded to him by the queen of Hungary; but it was taken from him in 1746, after a bloody battle. The French got poſſeſſion of it in 1796. It has a famous univerſity, and the inhabitants are much eſteemed for their politeneſs. There is a great fair here every year on the 15th of April, which is much frequented. Placentia is about 32 miles north-weſt of Parma and 83 eaſt of Turin. E. Long. 10. 24. N. Lat. 45. 5.

PLAGIARY, in *Philology*, the purloining another man's works, and putting them off as our own. Among the Romans, *plagiarius* was properly a perſon who bought, ſold, or retained a freeman for a ſlave; and was ſo called, becauſe, by the Flavian law, ſuch perſons were condemned *ad plagas*, "to be whipped."

Thomaſius has an expreſs treatiſe *De plagio literario*; wherein he lays down the laws and meaſures of the right which authors have to one another's writings.—"Dictionary writers, at leaſt ſuch as meddle with *arts and ſciences* (as is pertinently obſerved by Mr Chambers), ſeem exempted from the common laws of *meum* and *tuum*: they do not pretend to ſet up on their own bottom, nor to treat you at their own coſt. Their works are ſuppoſed, in great meaſure, compoſitions of other peoples; and what they take from others, they do it avowedly, and in the open ſun.—In effect, their quality gives them a title to every thing that may be for their purpoſe, wherever they find it; and if they rob, they do not do it any otherwiſe than as the bee does, for the public ſervice. Their occupation is not pilfering, but collecting contributions; and, if you aſk them their authority, they will produce you the practice of their predeceſſors of all ages and nations."

PLAGIUM, in *Law*. See Kidnapping.

PLAGUE, Pestilence, or *Peſtilential Fever*, is a very acute, malignant, and contagious diſeaſe; being a putrid fever of the worſt kind, and ſeldom failing to prove mortal. Though it is generally defined a malignant fever, Diemerbrock thinks they ought to be diſtinguiſhed, ſince the fever is not the eſſence of the diſeaſe, but merely a ſymptom or effect of it. See Medicine, nº 221.

The plague, as is generally agreed, is never bred or propagated in Britain, but always imported from abroad, eſpecially from the Levant, Leſſer Aſia, Egypt, &c. where it is very common. Sydenham has remarked that it rarely infeſts this country oftener than once in 40 years, and happily we have been free of it for a much longer period.

Authors are not as yet agreed concerning the nature of this dreadful diſtemper. Some think that inſects are the cauſe of it, in the ſame way that they are the cauſe of blights, being brought in ſwarms from other climates by the wind, when they are taken into the lungs in reſpiration; the conſequence of which is, that they mix with the blood and juices, and attack and corrode the viſcera. Mr Boyle, on the other hand, thinks it originates from the effluvia or exhalations breathed into the atmoſphere from noxious minerals, to which may be added ſtagnant waters and putrid bodies of every kind.

Mr Gibbon thinks that the plague is derived from damp, hot, and ſtagnating air, and the putrefaction of animal ſubſtances, eſpecially locuſts. See *Gibbon's Roman Hiſtory*, 4to edit. vol. iv. p. 327—332, where there is alſo a very particular account of the plague which depopulated the earth in the time of the emperor Juſtinian.

The Mahometans believe that the plague proceeds from certain ſpirits, or goblins, armed with bows and arrows, ſent by God to puniſh men for their ſins; and that when the wounds are given by ſpectres of a black colour, they certainly prove fatal, but not ſo when the arrows are ſhot by thoſe that appear white. They therefore take no precaution to guard themſelves againſt it. The wiſer profeſſors of this religion, however, at preſent act otherwiſe; for we find a receipt recommended by Sidy Mohammed Zerroke, one of the moſt celebrated Marabouts, prefaced with theſe remarkable words: "The lives of us all are in the hands of God, when it is we muſt die. However, it hath pleaſed him to ſave many perſons from the plague, by taking every morning while the infection rages, one pill or two of the following compoſition; viz. of myrrh two parts, ſaffron one part, of aloes two parts, of ſyrup of myrtle berries, *q. ſ.*" But this remedy is confined to the more enlightened; for the bigotry of the lower ſort is ſo extreme as to make them deſpiſe all precautions which people of other nations uſe. Of this extreme and fooliſh prejudice Dr Chandler gives an intereſting account when ſpeaking of the plague at Smyrna. This learned author is of opinion that the diſeaſe ariſes from animalcules, which he ſuppoſes to be inviſible. See *Chandler's Travels in Aſia Minor*, p. 279. &c.

It is a remarkable fact, that *plagues* are ſometimes partial, and that they only attack particular animals, or a particular deſcription of perſons, avoiding others altogether, or attacking them but ſlightly. Thus Fernelius informs us of a plague, or murrain, in 1514, which invaded only cats. Dionyſius Halicarnaſſeus mentions a plague which attacked none but maids; and that which raged in the time of Gentilis, killed ſcarcely any women, and very few but luſty men. Boterus mentions another plague, which aſſaulted none but the younger ſort; and we have inſtances of the ſame kind of a later ſtanding (A). Cardan ſpeaks of a plague at Baſil, with which the Switzers were infected, and the Italians, Germans, or French, exempted: and John Utenhovius takes notice of a dreadful one at Copenhagen, which, though it raged among the Danes, ſpared the Germans, Dutch, and Engliſh, who went with all freedom, and without the leaſt danger, to the houſes of the infected. During the plague which ravaged Syria in 1760, it was obſerved that people of the ſoundeſt conſtitutions were the moſt liable to it, and that the weak and delicate were either ſpared or eaſily cured. It was moſt fatal to the Moors; and, when it attacked them, it was generally incurable.

When the plague raged in Holland in 1636, a young girl was ſeized with it, had three carbuncles, and was removed to a garden, where her lover, who was betrothed to her, attended her as a nurſe, and ſlept with her as his wife. He remained uninfected, and ſhe recovered, and was married to him. The ſtory is related by Vinc. Fabricius in the *Miſc. Cur. Ann. II. Obſ.* 188.

Many methods have been adopted in different countries to prevent the importation of this dreadful ſcourge of the human race, and to ſtop the progreſs of infection after it has been imported. In England, mayors, bailiffs, head officers of corporations, and juſtices of peace, have power to tax inhabitants, houſes, and lands, &c. within their precincts, for the relief of perſons infected with the plague; and juſtices of the county may tax perſons within five miles round, on a pariſh's inability; the tax to be levied by diſtreſs and ſale of goods, or in default thereof by impriſonment. Infected perſons going abroad, after being commanded to keep houſe for avoiding farther infections, may be reſiſted by watchmen, &c. and puniſhed as vagrants, if they have no ſores upon them; and if they have infectious ſores on them it is felony. Juſtices of the peace, &c. are to appoint ſearchers, examiners, and buriers of the dead, in places infected, and adminiſter oaths to them for the performance of their duties, &c. *ſtat.* 1 *Jac.* 1. *cap.* 31. See Quarantine.

The commiſſion at Moſcow having, in the year 1770, invented a fumigation-powder, which, from ſeveral leſſer experiments, had proved efficacious in preventing the infection of the plague; in order more fully to aſcertain its virtue in that reſpect, it was determined,

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(A) See the account of the *yellow fever* under the article Philadelphia, where it appears that the diſeaſe was leſs fatal to ſome ſorts of perſons than to others.

termined, towards the end of the year, that ten malefactors under ſentence of death ſhould, without undergoing any other precautions than the fumigations, be confined three weeks in a lazaretto, be laid upon the beds, and dreſſed in the clothes, which had been uſed by perſons ſick, dying, and even dead, of the plague in the hoſpital. The experiment was accordingly tried, and none of the ten malefactors were then infected, or have been ſince ill. The fumigation powder is prepared as follows.

Powder of the firſt ſtrength.] Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum wood pounded, of each ſix pounds; common ſaltpetre pounded, eight pounds; ſulphur pounded, ſix pounds; Smyrna tar, or myrrh, two pounds: mix all the above ingredients together, which will produce a pood of the powder of fumigation of the firſt ſtrength. [*N. B.* A pood is 40 pounds Ruſſian, which are equal to 35 pounds and a half or 36 pounds Engliſh avoirdupoiſe.]

Powder of the ſecond ſtrength.] Take ſouthernwood cut into ſmall pieces, four pounds; juniper berries pounded, three pounds; common ſaltpetre pounded, four pounds; ſulphur pounded, two pounds and a half; Smyrna tar, or myrrh, one pound and a half: mix the above together, which will produce half a pood of the powder of fumigation of the ſecond ſtrength.

Odoriferous powder.] Take the root called *kalmus* cut into ſmall pieces, three pounds; leaves of juniper cut into ſmall pieces four pounds; frankincenſe pounded groſsly, one pound; ſtorax pounded, and roſe flowers, half a pound; yellow amber pounded, one pound; common ſaltpetre pounded, one pouud and a half; ſulphur, a quarter of a pound: mix all the above together, which will produce nine pounds and three quarters of the odoriferous powder.

Remark on the powder of fumigation]. If guaiacum cannot be had, the cones of pines or firs may be uſed in its ſtead; likewiſe common tar of pines and firs may be uſed inſtead of the Smyrna tar, or myrrh, and mugwort may ſupply the place of ſouthernwood.

Thucydides, who was himſelf infected, lib. ii. gives us an account of a dreadful plague which happened at Athens about the year before Chriſt 430, while the Peloponneſians under the command of Archidamus waſted all her territory abroad; but of theſe two enemies the plague was by far the moſt dreadful and ſevere.

The moſt dreadful plague that ever raged at Rome was in the reign of Titus. A. D. 80. The emperor left no remedy unattempted to abate the malignity of the diſtemper, acting during its continuance like a father to his people. The ſame fatal diſeaſe raged in all the provinces of the Roman empire in the reign of M. Aurelius, A. D. 167, and was followed by a dreadful famine, by earthquakes, inundations, and other calamities. The Romans believed that Æſculapius ſometimes entered into a ſerpent, and cured the plague.

About the year 450 the plague viſited Britain, juſt after the Picts and Scots had made a formidable invaſion of the ſouthern part of the iſland. The plague raged with uncommon fury, and ſwept away moſt of thoſe whom the ſword and famine had ſpared, ſo that the living were ſcarcely ſufficient to bury the dead.

About the year 1348 the plague became almoſt general over Europe. A great many authors give an account of this plague, which is ſaid to have appeared firſt in the kingdom of Kathay in the year 1346, and to have proceeded gradually weſtward to Conſtantinople and Egypt. From Conſtantinople it paſſed into Greece, Italy, France, and Africa, and by degrees along the coaſts of the ocean into Britain and Ireland, and afterwards into Germany, Hungary, Poland, Denmark and the other northern kingdoms. According to Antoninus archbiſhop of Florence the diſtemper carried off 60,000 people in that city, among whom was the hiſtorian John Villani.

In the year 1656 the plague was brought from Sardinia to Naples, being introduced into the city by a tranſport with ſoldiers on board. It raged with exceſſive violence, carrying off in leſs than ſix months 400,000 of the inhabitants. The diſtemper was at firſt called by the phyſicians a malignant fever; but one of them affirming it to be peſtilential, the viceroy, who was apprehenſive leſt ſuch a report would occaſion all communication with Naples to be broke off, was offended with this declaration, and ordered him to be impriſoned. As a favour, however, he allowed him to return and die in his own houſe. By this proceeding of the viceroy, the diſtemper being neglected, made a moſt rapid and furious progreſs, and filled the whole city with conſternation. The ſtreets were crowded with confuſed proceſſions, which ſerved to ſpread the infection through all the quarters. The terror of the people increaſed their ſuperſtition; and it being reported that a certain nun had propheſied that the peſtilence would ceaſe upon building a hermitage for her ſiſter nuns upon the hill of St Martin's, the edifice was immediately begun with the moſt ardent zeal. Perſons of the higheſt quality ſtrove who ſhould perform the meaneſt offices: ſome loading themſelves with beams, and others carrying baſkets full of lime and nails, while perſons of all ranks ſtripped themſelves of their moſt valuable effects, which they threw into empty hogſheads placed in the ſtreets to receive the charitable contributions. Their violent agitation, however, and the increaſing heats, diffuſed the malady through the whole city, and the ſtreets and the ſtairs of the churches were filled with the dead; the number of whom, for ſome time of the month of July, amounted daily to 15,000.

The viceroy now uſed all poſſible precautions to abate the fury of the diſtemper, and to prevent its ſpreading to the provinces. The infection, however, deſolated the whole kingdom, excepting the provinces of Otranto and the Farther Calabria, and the cities of Gaeta, Sorrento, Paolo, and Belvedere. The general calamity was increaſed in Naples by malecontents, who inſinuated that the diſtemper had been deſignedly introduced by the Spaniards, and that there were people in diſguiſe who went through the city ſowing poiſoned duſt. This idle rumour enraged the populace, who began to inſult the Spaniſh ſoldiers, and threaten a ſedition; ſo that the viceroy, to pacify the mob, cauſed a criminal to be broke upon the wheel, under pretence that he was a diſperſer of the duſt. A violent and plentiful rain falling about the middle of Auguſt, the diſtemper began to abate; and on the eighth of December the phyſicians made a ſolemn declaration that the city was entirely free from infection.

Of the dreadful plague which raged at London in the year 1665, the reader will find an account in the article LONDON, N° 21. In 1720 the city of Marseilles was visited with this destructive disease, brought in a ship from the Levant; and in seven months, during which time it continued, it carried off not less than 60,000 people. This desolation is not yet obliterated from the minds of the inhabitants; some survivors remained alive but a few years ago to transmit a traditional account of it to after ages. There are two fine pictures, painted by Puget, representing some of the horrid scenes at that time. "They are (says Lady Craven) only too well executed. I saw several dying figures at the knees of their friends, and looking their last, anxious, kind, and wishful prayers on their sick infants, that made the tears flow down my cheeks. I was told the physicians and noblemen who were attending the sick and dying, were all portraits: I can easily conceive it; for in some faces there is a look of reflection and concern which could only be drawn from the life." *Letters*, p. 34, 35. This fatal event has caused the laws of quarantine to be very strictly enforced in the lazaretto here, which is an extensive insulated building.

The ravages of this disease have been dreadful wherever it has made its appearance. On the first arrival of the Europeans at the island of Gran Canaría, it contained 14,000 fighting men, soon after which, two thirds of the whole inhabitants fell a sacrifice to the plague, which had doubtless been introduced by their new visitors. The destruction it has made in Turkey in Europe, and particularly in Constantinople, must be known to every reader; and its fatal effects have been particularly heightened there by that firm belief which prevails among the people of predestination, &c. as has been already mentioned. It is generally brought into European Turkey from Egypt; where it is very frequent, especially at *Grand Cairo*. To give even a list of all the plagues which have desolated many flourishing countries, would extend this article beyond all bounds; and minutely to describe them all, would be impossible. For the plague at Smyrna, we refer to Chandler's Travels as above. Respecting that which raged in Syria in 1760, we refer to the Abbé Mariti's Travels through Cyprus, Syria, and Palestine, vol. i. p. 278—296. This plague was one of the most malignant and fatal that Syria ever experienced; for it scarcely made its appearance in any part of the body when it carried off the patient.

In addition to what the reader will find upon this subject in the article MEDICINE, and the observations which have now been offered, we beg leave to state the sentiments of Berthier on this subject, in his account of Bonaparte's expedition into Syria.

"At the time of our entry into Syria, (says he) all the towns were infected by the plague; a malady which ignorance and barbarity render so fatal in the east. Those who are affected by it give themselves up for dead; they are immediately abandoned by every body, and are left to die, when they might have been saved by medicine and attention.

"Citizen Degenettes, principal physician to the army, displayed a courage and character which entitle him to the national gratitude. When our soldiers were attacked by the least fever, it was supposed that they had caught the plague, and these maladies were confounded. The fever hospitals were abandoned by the officers of health and their attendants. Citizen Degenettes repaired in person to the hospitals, visited all the patients, felt the glandular swellings, dressed them, declared and maintained that the distemper was not the plague, but a malignant fever with glandular swellings, which might easily be cured by attention, and keeping the patient's mind easy."

The views of Degenettes in making this distinction were worthy of the highest commendation; but Dr Moseley maintains that this fever was actually the plague. The physician, however, carried his courage so far, as to make two incisions, and to inoculate the suppurated matter from one of these buboes above his breast, and under his armpits, but was not affected with the malady. He thus eased the minds of the soldiers, the first step to a cure; and, by his assiduity and constant attendance in the hospitals, a number of men attacked with the plague were cured. His example was followed by other officers of health. "There are, says Dr Moseley, annual or seasonal disorders, more or less severe, in all countries; but the plague, and other great depopulating epidemics, do not always obey the seasons of the year. Like comets, their course is eccentric. They have their revolutions; but from whence they come, or whether they go after they have made their revolution, no mortal can tell.

"Diseases originating in the atmosphere seize some, and pass by others; and act exclusively on bodies graduated to receive their impressions; otherwise whole nations would be destroyed. In some constitutions of the body the access is easy, in some difficult, and in others impossible.

"The air of confined places may be so vitiated as to be unfit for the purposes of the healthy existence of any person. Hence gaol, hospital, and ship fevers. But, as these distempers are the offspring of a local cause, that local cause, and not the distempered people, communicate the disease.

"The infection, were it not in the atmosphere, would be confined within very narrow limits; have a determinate sphere of action; and none but physicians and attendants on the sick would suffer; and these must suffer; and the cause and the effects would be palpable to our senses. Upon this ground, the precaution of quarantine would be rational. But who then would visit and attend the sick, or could live in hospitals, prisons, and lazarettos?"

The author is convinced from these reasonings, that the bubo and carbuncle, of which we hear so much in Turkey, and read so much in our own history of plagues, arise from heating food and improper treatment; that they contain no infection; and consequently that they are not the natural deposit of the morbific virus separated from the contagion.

Speaking of the plague, Mr Brown says, "the first symptoms are said to be thirst; 2. Cephalagia; 3. A stiff and uneasy sensation, with redness and tumour about the eyes; 4. Watering of the eyes; 5. White pustules on the tongue. Not uncommonly, all these have successively shown themselves, yet the patient has recovered; in which case, where suppuration has had place, the skin always remains discoloured, commonly of a purple hue. Many who have been bled in an early stage of the disorder, have recovered without any fatal ſymptoms; but whether from this, or any other cauſe, does not appear certain."

Oil rubbed into the ſkin acts as a preventive, as well as a cure of the plague. When the operation is performed to prevent infection, it is ſucceſsfully performed with that view at Smyrna, as often as the plague makes its appearance in the city. As it is not done for the purpoſe of promoting perſpiration, it is not requiſite that it ſhould be performed with the ſame ſpeed as when for curing the diſorder; nor is it neceſſary to abſtain from fleſh, and to uſe ſoups; but it will be proper to uſe only fowls or veal for ſome days, without any ſeaſoning. It will in fine be neceſſary to guard againſt indigeſtible food, and ſuch liquors as might put in motion or inflame the maſs of the blood.

This intereſting diſcovery merits the attention of all medical men; for if olive oil has been found efficacious in curing or preſerving againſt one ſpecies of infection, it is not abſurd to ſuppoſe that the ſame or other kinds of oil might be productive of much benefit in other malignant infectious diſeaſes. We hope ſoon to hear of ſome trial being made with it in this country. Would it be of any ſervice in the yellow fever, ſo prevalent in the weſtern world?

PLAIN, or PLANE, in general, an appellation given to whatever is ſmooth and even, or ſimple, obvious, and eaſy to be underſtood; and, conſequently, ſtands oppoſed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform ſurface; from every point of whoſe perimeter right lines may be drawn to every other point in the ſame.

A plain angle is one contained under two lines, or ſurfaces, in contradiſtinction to a ſolid angle. See ANGLE under GEOMETRY.

The doctrine of plain triangles, as thoſe included under three right lines, is termed *plain trigonometry*. See the article TRIGONOMETRY.

PLAIN Chart. See the article CHART.

PLAIN Sailing. See NAVIGATION.

PLAISE, the Engliſh name of a ſpecies of pleuronectes. See PLEURONECTES, ICHTHYOLOGY *Index*.

PLAN, in general, denotes the repreſentation of ſomething drawn on a plane; ſuch are maps, charts, ichnographies, &c. See MAP, CHART, &c.

The term *plan*, however, is particularly uſed for a draught of a building, ſuch as it appears, or is intended to appear, on the ground, ſhowing the extent, diviſion, and diſtribution of its area or ground-plot into apartments, rooms, paſſages, &c.

A geometrical plan is that wherein the ſolid and vacant parts are repreſented in their natural proportions.

The raiſed plan of a building is the ſame with what is otherwiſe called an *elevation* or *orthography*. See ORTHOGRAPHY.

A perſpective plan is that exhibited by degradations or diminutions, according to the rules of perſpective. See PERSPECTIVE.

To render plans intelligible, it is uſual to diſtinguiſh the maſſives with a black waſh; the projectures on the ground are drawn in full lines, and thoſe ſuppoſed over them in dotted lines. The augmentations or alterations to be made are diſtinguiſhed by a colour different from what is already built; and the tints of each plan made lighter as the ſtories are raiſed.

In large buildings it is uſual to have three ſeveral plans for the three firſt ſtories.

PLANCUS, FRANCIS, doctor of phyſic, was born at Amiens in 1696, and died on the 19th of September 1765, aged 69 years. He is the author of ſome works which have had conſiderable reputation. 1. A complete Syſtem of Surgery, in 2 vols in 12mo; a treatiſe much recommended by ſurgeons to their pupils. 2. A choice Library of Medicine, taken from periodical publications, both French and others: this curious collection, continued and completed by M. Goulin, makes 9 vols in 4to, or 18 vols in 12mo. 3. A Tranſlation of Vander Wiel's Obſervations on Medicine and Surgery, 1758, 2 vols in 12mo. Plancus was alſo the editor of various editions of works on medicine and ſurgery, which he enriched with notes.

PLANE, in *Geometry*, denotes a plain ſurface, or one that lies evenly between its bounding lines: and as a right line is the ſhorteſt extenſion from one point to another, ſo a plane ſurface is the ſhorteſt extenſion from one line to another.

In aſtronomy, conics, &c. the term *plane* is frequently uſed for an imaginary ſurface, ſuppoſed to cut and paſs through ſolid bodies; and on this foundation is the whole doctrine of conic ſections built. See ASTRONOMY, CONIC *Sections*, &c.

In mechanics, planes are either horizontal, that is, parallel to the horizon, or inclined thereto. See MECHANICS.

The determining how far any given plane deviates from an horizontal line, makes the whole buſineſs of levelling. See the article LEVELLING.

In optics, the planes of reflection and refraction are thoſe drawn through the incident and reflected or refracted rays. See OPTICS.

In perſpective we meet with the perſpective plane, which is ſuppoſed to be pellucid, and perpendicular to the horizon; the horizontal plane, ſuppoſed to paſs through the ſpectator's eye, parallel to the horizon; the geometrical plane, likewiſe parallel to the horizon, wherein the object to be repreſented is ſuppoſed to be placed, &c. See PERSPECTIVE.

The plane of projection in the ſtereographic projection of the ſphere, is that on which the projection is made, correſponding to the perſpective plane. See PROJECTION.

PLANE, in joinery, an edged tool or inſtrument for paring and ſhaving of wood ſmooth. It conſiſts of a piece of wood very ſmooth at bottom, as a ſtock or ſhaft; in the midſt of which is an aperture, through which a ſteel edge, or chiſſel, placed obliquely, paſſes; which, being very ſharp, takes off the inequalities of the wood along which it ſlides.

PLANE-Tree, in *Botany*. See PLATANUS.

PLANET, a celeſtial body, revolving round the ſun as a centre, and continually changing its poſition with reſpect to the fixed ſtars; whence the name [illegible], which is a Greek word, ſignifying "wanderer."

The planets are uſually diſtinguiſhed into primary and ſecondary. The primary ones, called by way of eminence *planets*, are thoſe which revolve round the ſun as a centre; and the ſecondary planets, more uſually called *ſatellites* or *moons*, are thoſe which revolve round a primary planet as a centre, and conſtantly attend it in its revolution round the ſun.

The primary planets are again diſtinguiſhed into ſuperior and inferior. The ſuperior planets are thoſe farther from the ſun than our earth; as Mars, Jupiter, Saturn, and the Georgium Sidus; and the inferior planets are thoſe nearer the ſun than our earth, as Venus and Mercury. For an account of the planets lately diſcovered, ſee VESTA.

That the planets are opaque bodies, like our earth, is thought probable for the following reaſons. 1. Since in Venus, Mercury, and Mars, only that part of the diſk illuminated by the ſun is found to ſhine; and again, Venus and Mercury, when between the earth and the ſun, appear like dark ſpots or maculæ on the ſun's diſk; it is evident, that Mars, Venus, and Mercury, are opaque bodies, illuminated with the borrowed light of the ſun. And the ſame appears of Jupiter, from its being void of light in that part to which the ſhadow of the ſatellites reaches, as well as in that part turned from the ſun; and that his ſatellites are opaque, and reflect the ſun's light, is abundantly ſhown. Again, ſince Saturn, with his ring and ſatellites, only yield a faint light, fainter conſiderably than that of the fixed ſtars, though theſe be vaſtly more remote, and than that of the reſt of the planets; it is paſt doubt that he too with his attendants are opaque bodies. 2. Since the ſun's light is not tranſmitted through Mercury and Venus, when placed againſt him, it is plain they are denſe opaque bodies; which is likewiſe evident of Jupiter, from his hiding the ſatellites in his ſhadow; and therefore, by analogy, the ſame may be concluded of Saturn. 3. From the variable ſpots of Venus, Mars, and Jupiter, it is evident theſe planets have a changeable atmoſphere; which changeable atmoſphere may, by a like argument, be inferred of the ſatellites of Jupiter; and therefore, by ſimilitude, the ſame may be concluded of the other planets. 4. In like manner, from the mountains obſerved in Venus, the ſame may be ſuppoſed in the other planets. 5. Since, then, Saturn, Jupiter, and the ſatellites of both, Mars, Venus, and Mercury, are opaque bodies ſhining with the ſun's borrowed light, are furniſhed with mountains, and encompaſſed with a changeable atmoſphere; they have, it is concluded, waters, ſeas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. And hence it ſeems alſo highly probable, that the other planets have their animal inhabitants as well as our earth.

PLANETARIUM, an aſtronomical machine, ſo called from its repreſenting the motions, orbits, &c. of the planets, agreeable to the Copernican ſyſtem. See ASTRONOMY.

PLANETARY, ſomething that relates to the planets. Hence we ſay, planetary worlds, planetary inhabitants, &c. See PLANET.

PLANETARY Syſtem, is the ſyſtem or aſſemblage of the planets, primary and ſecondary, moving in their reſpective orbits, round their common centre the ſun. See ASTRONOMY.

PLANETARY Days.—Among the ancients, the week was ſhared among the ſeven planets, each planet having its day. This we learn from Dion Caſſius and Plutarch, *Sympoſ.* l. 4. q. 7. Herodotus adds, that it was the Egyptians who firſt diſcovered what god, that is, what planet, preſides over each day; for that among this people the planets were directors. And hence it is, that in moſt European languages the days of the week are ſtill denominated from the planets; Sunday, Monday, &c. See WEEK.

PLANETARY Years, the periods of time in which the ſeveral planets make their revolutions round the ſun or earth.—As from the proper revolution of the ſun, the ſolar year takes its original; ſo from the proper revolutions of the reſt of the planets about the earth, ſo many ſorts of years do ariſe, viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours, 58 minutes, equivalent in a round number to 30 ſolar years. The Jovial year, containing 317 days, 14 hours, 59 minutes. —The Martial year, containing 321 days, 23 hours, 31 minutes. For Venus and Mercury, as their years, when judged of with regard to the earth, are almoſt equal to the ſolar year; they are more uſually eſtimated from the ſun, the true centre of their motions: in which caſe, the former is equal to 224 days, 16 hours, 40 minutes; the latter to 87 days, 23 hours, 14 minutes.

PLANIMETRY, that part of geometry which conſiders lines and plain figures, without conſidering their height or depth. See GEOMETRY.

PLANISPHERE, ſignifies a projection of the ſphere, and its various circles on a plane; in which ſenſe, maps, whereon are exhibited the meridians and other circles of the ſphere, are planiſpheres. See MAP.

PLANT is defined to be an organical body, deſtitute of ſenſe and ſpontaneous motion, adhering to another body in ſuch a manner as to draw from it its nouriſhment, and having a power of propagating itſelf by ſeeds.

The vegetation and economy of plants is one of thoſe ſubjects in which our knowledge is extremely circumſcribed. A total inattention to the ſtructure and economy of plants is the chief reaſon of the ſmall progreſs that has been made in the principles of vegetation, and of the inſtability and fluctuation of our theories concerning it; for which reaſon we ſhall give a ſhort deſcription of the ſtructure of plants, beginning with the ſeed, and tracing its progreſs and evolution to a ſtate of maturity.

1. *Of Seeds.*] The ſeeds of plants are of various figures and ſizes. Moſt of them are divided into two lobes; though ſome, as thoſe of the creſs-kind, have ſix; and others, as the grains of corn, are not divided, but entire.

But as the eſſential properties of all ſeeds are the ſame, when conſidered with regard to the principles of vegetation, our particular deſcriptions ſhall be limited to one ſeed, viz. the great garden-bean. Neither is the choice of this ſeed altogether arbitrary; for, after it begins to vegetate, its parts are more conſpicuous than many others, and conſequently better calculated for inveſtigation.

This ſeed is covered with two coats or membranes. The outer coat is extremely thin, and full of pores; but may be eaſily ſeparated from the inner one (which is much thicker), after the bean has been boiled, or lain a few days in the ſoil. At the thick end of the bean there is a ſmall hole viſible to the naked eye, immediately over the radicle or future root, that it may have a free paſſage into the ſoil (fig. 1. A). When theſe coats are taken off, the body of the ſeed appears, which is divided Plate CCCCXX.

ed into two ſmooth portions or lobes. The ſmoothneſs of the lobes is owing to a thin film or cuticle with which they are covered.

At the baſis of the bean is placed the radicle or future root (fig. 3. A). The trunk of the radicle, juſt as it enters into the body of the ſeed, divides into two capital branches, one of which is inſerted into each lobe, and ſends off ſmaller ones in all directions through the whole ſubſtance of the lobes (fig. 4. AA). Theſe ramifications become ſo extremely minute towards the edges of the lobes, that they require the fineſt glaſſes to render them viſible. To theſe ramifications Grew and Malpighi have given the name of *ſeminal root;* becauſe, by means of it, the radicle and plume, before they are expanded, derive their principal nouriſhment.

The plume, bud, or germ (fig. 3.), is incloſed in two ſmall correſponding cavities in each lobe. Its colour and conſiſtence is much the ſame with thoſe of the radicle, of which it is only a continuation, but having a quite contrary direction; for the radicle deſcends into the earth, and divides into a great number of ſmaller branches or filaments; but the plume aſcends into the open air, and unfolds itſelf into all the beautiful variety of ſtem, branches, leaves, flower, fruit, &c. The plume in corn ſhoots from the ſmaller end of the grain, and amongſt maltſters goes by the name of *acroſpire*.

The next thing to be taken notice of is the ſubſtance or parenchymatous part of the lobes. This is not a mere concreted juice, but is curiouſly organized, and conſiſts of a vaſt number of ſmall bladders reſembling thoſe in the pith of trees (fig. 5.).

Beſides the coats, cuticle, and parenchymatous parts, there is a ſubſtance perfectly diſtinct from theſe, diſtributed in different proportions through the radicle, plume, and lobes. This inner ſubſtance appears very plainly in a tranſverſe ſection of the radicle or plume. Towards the extremity of the radicle it is one entire trunk; but higher up it divides into three branches; the middle one runs directly up to the plume, and the other two paſs into the lobes on each ſide, and ſpread out into a great variety of ſmall branches through the whole body of the lobes (fig. 4.). This ſubſtance is very properly termed the *ſeminal root:* for when the ſeed is ſown, the moiſture is firſt abſorbed by the outer coats, which are everywhere furniſhed with ſap and air-veſſels; from theſe it is conveyed to the cuticle; from the cuticle it proceeds to the pulpy part of the lobes; when it has got thus far, it is taken up by the mouths of the ſmall branches of the ſeminal root, and paſſes from one branch into another, till it is all collected into the main trunk, which communicates both with the plume and radicle, the two principal involved organs of the future plant. After this the ſap or vegetable food runs in two oppoſite directions: part of it aſcends into the plume, and promotes the growth and expanſion of that organ; and part of it deſcends into the radicle, for nouriſhing and evolving the root and its various filaments. Thus the plume and radicle continue their progreſs in oppoſite directions till the plant arrives at maturity.

It is here worth remarking, that every plant is really poſſeſſed of two roots, both of which are contained in the ſeed. The plume and radicle, when the ſeed is firſt depoſited in the earth, derive their nouriſhment from the ſeminal root; but, afterwards, when the radicle begins to ſhoot out its filaments, and to abſorb ſome moiſture, not, however, in a ſufficient quantity to ſupply the exigencies of the plume, the two lobes, or main body of the ſeed, riſe along with the plume, aſſume the appearance of two leaves, reſembling the lobes of the ſeed in ſize and ſhape, but having no reſemblance to thoſe of the plume, for which reaſon they have got the name of *diſſimilar leaves*.

Theſe diſſimilar leaves defend the young plume from the injuries of the weather, and at the ſame time, by abſorbing dew, air, &c. aſſiſt the tender radicle in nouriſhing the plume, with which they have ſtill a connection by means of the ſeminal root above deſcribed. But when the radicle or ſecond root has deſcended deep enough into the earth, and has acquired a ſufficient number of filaments or branches for abſorbing as much aliment as is proper for the growth of the plume; then the ſeminal or diſſimilar leaves, their utility being entirely ſuperſeded, begin to decay and fall off.

Plate CCCCXX.

Fig. 1. A, the foramen or hole in the bean through which the radicle ſhoots into the ſoil.

Fig. 2. A tranſverſe ſection of the bean; the dots being the branches of the ſeminal root.

Fig. 3. A, the radicle. B, the plume or bud.

Fig. 4. A view of the ſeminal root branched out upon the lobes.

Fig. 5. A longitudinal ſection of one of the lobes of the bean a little magnified, to ſhow the ſmall bladders of which the pulpy or parenchymatous part is compoſed.

Figs. 6. 7. A, a tranſverſe ſection of the radicle. B, a tranſverſe ſection of the plume, ſhowing the organs or veſſels of the ſeminal root.

Fig. 8. The appearance of the radicle, plume, and ſeminal root, when a little further advanced in growth.

Having thus briefly deſcribed the ſeed, and traced its evolution into three principal organic parts, viz. the plume, radicle, and ſeminal leaves, we ſhall next take an anatomical view of the root, trunk, leaves, &c.

2. *Of the root.*] In examining the root of plants, the firſt thing that preſents itſelf is the ſkin, which is of various colours in different plants. Every root, after it has arrived at a certain age, has a double ſkin. The firſt is coeval with the other parts, and exiſts in the ſeed: but afterwards there is a ring ſent off from the bark, and forms a ſecond ſkin; *e. g.* in the root of the dandelion, towards the end of May, the original or outer ſkin appears ſhrivelled, and is eaſily ſeparated from the new one, which is freſher, and adheres more firmly to the bark. Perennial plants are ſupplied in this manner with a new ſkin every year; the outer one always falls off in the autumn and winter, and a new one is formed from the bark in the ſucceeding ſpring. The ſkin has numerous cells or veſſels, and is a continuation of the parenchymatous part of the radicle. However, it does not conſiſt ſolely of parenchyma; for the microſcope ſhows that there are many tubular ligneous veſſels interſperſed through it.

When the ſkin is removed, the true cortical ſubſtance or bark appears, which is alſo a continuation of the parenchymatous part of the radicle, but greatly augmented. The bark is of very different ſizes. In moſt trees it is exceeding thin in proportion to the wood and pith. On the other hand, in carrots, it is almoſt one-half of the ſemidiameter of the root; and, in dandelion, it is nearly twice as thick as the woody part.

The bark is compoſed of two ſubſtances; the parenchyma or pulp, which is the principal part, and a few woody fibres. The parenchyma is exceedingly porous, and has a great reſemblance to a ſpunge: for it ſhrivels conſiderably when dried, and dilates to its former dimenſions when infuſed in water. Theſe pores or veſſels are not pervious, ſo as to communicate with each other; but conſiſt of diſtinct little cells or bladders, ſcarcely viſible without the aſſiſtance of the microſcope. In all roots, theſe cells are conſtantly filled with a thin watery liquor. They are generally of a ſpherical figure; though in ſome roots, as the bugloſs and dandelion, they are oblong. In many roots, as the horſe-radiſh, peony, aſparagus, potato, &c. the parenchyma is of one uniform ſtructure. But in others it is more diverſified, and puts on the ſhape of rays, running from the centre towards the circumference of the bark. Theſe rays ſometimes run quite through the bark, as in lovage; and ſometimes advance towards the middle of it, as in melilot and moſt of the leguminous and umbelliferous plants. Theſe rays generally ſtand at an equal diſtance from each other in the ſame plant; but the diſtance varies greatly in different plants. Neither are they of equal ſizes: in carrot they are exceedingly ſmall, and ſcarcely diſcernible; in melilot and chervil, they are thicker. They are likewiſe more numerous in ſome plants than in others. Sometimes they are of the ſame thickneſs from one edge of the bark to the other; and ſome grow wider as they approach to the ſkin. The veſſels with which theſe rays are amply furniſhed, are ſuppoſed to be air-veſſels, becauſe they are always found to be dry, and not ſo tranſparent as the veſſels which evidently contain the ſap.

In all roots there are ligneous veſſels diſperſed in different proportions through the parenchyma of the bark. Theſe ligneous veſſels run longitudinally through the bark in the form of ſmall threads, which are tubular, as is evident from the riſing of the ſap in them when a root is cut tranſverſely. Theſe ligneous ſap-veſſels do not run in direct lines through the bark, but at ſmall diſtances incline towards one another, in ſuch a manner that they appear to the naked eye to be inoſculated; but the microſcope diſcovers them to be only contiguous, and braced together by the parenchyma. Theſe braces or coarctations are very various both in ſize and number in different roots; but in all plants they are moſt numerous towards the inner edge of the bark. Neither are theſe veſſels ſingle tubes; but, like the nerves in animals, are bundles of 20 or 30 ſmall contiguous cylindrical tubes, which uniformly run from the extremity of the root, without ſending off any branches or ſuffering any change in their ſize or ſhape.

In ſome roots, as parſnep, eſpecially in the ring next the inner extremity of the bark, theſe veſſels contain a kind of lymph, which is ſweeter than the ſap contained in the bladders of the parenchyma. From this circumſtance they have got the name of *lymph-ducts*.

Theſe lymph-ducts ſometimes yield a mucilaginous lymph, as in the comfrey; and ſometimes a white milky glutinous lymph, as in the angelica, ſonchus, burdock, ſcorzonera, dandelion, &c. The lymph-ducts are ſuppoſed to be the veſſels from which the gums and balſams are ſecerned. The lymph of fennel, when expoſed to the air, becomes a clear tranſparent balſam; and that of the ſcorzonera, dandelion, &c. condenſes into a gum.

The ſituation of the veſſels is various. In ſome plants they ſtand in a ring or circle at the inner edge of the bark, as in aſparagus; in others, they appear in lines or rays, as in borage; in the parſnep, and ſeveral other plants, they are moſt conſpicuous towards the outer edge of the bark; and in the dandelion, they are diſpoſed in the form of concentric circles.

The wood of roots is that part which appears after the bark is taken off, and is firmer and leſs porous than the bark or pith. It conſiſts of two diſtinct ſubſtances, viz. the pulpy or parenchymatous, and the ligneous. The wood is connected to the bark by large portions of the bark inſerted into it. Theſe inſertions are moſtly in the form of rays, tending to the centre of the pith, which are eaſily diſcernible by the eye in a tranſverſe ſection of moſt roots. Theſe inſertions, like the bark, conſiſt of many veſſels, moſtly of a round or oval figure.

The ligneous veſſels are generally diſpoſed in collateral rows running longitudinally through the root. Some of theſe contain air, and others ſap. The *air-veſſels* are ſo called, becauſe they contain no liquor. Theſe air-veſſels are diſtinguiſhed by being whiter than the others,

The pith is the centrical part of the root. Some roots have no pith, as the ſtramonium, nicotiana, &c.; others have little or none at the extremities of the roots, but have a conſiderable quantity of it near the top. The pith, like every other part of a plant, is derived from the ſeed; but in ſome it is more immediately derived from the bark: for the inſertions of the bark running in betwixt the rays of the wood, meet in the centre, and conſtitute the pith. It is owing to this circumſtance, that, among roots which have no pith in their lower parts, they are amply provided with it towards the top, as in columbine, lovage, &c.

The bladders of the pith are of very different ſizes, and generally of a circular figure. Their poſition is more uniform than in the bark. Their ſides are not mere films, but a compoſition of ſmall fibres or threads; which gives the pith, when viewed with a microſcope, the appearance of a piece of fine gauze or net-work.

We ſhall conclude the deſcription of roots with obſerving, that their whole ſubſtance is nothing but a congeries of tubes and fibres, adapted by nature for the abſorption of nouriſhment, and of courſe the extenſion and augmentation of their parts.

Fig. 9. A tranſverſe ſection of the root of wormwood as it appears to the naked eye.

Fig. 10. A ſection of fig. 9. magnified. AA, the ſkin, with its veſſels. BBBB, the bark. The round holes CCC, &c. are the lymph-ducts of the bark: All the other holes are little cells and ſap-veſſels. DDD, parenchymatous inſertions from the bark, with the cells, &c. EEEE, the rays of the wood, in which the holes are the air-veſſels. *N. B.* This root has no pith.

3. *Of the Trunk, Stalk, or Stem.*] In deſcribing the trunks of plants, it is neceſſary to premiſe, that whatever is ſaid with regard to them applies equally to the branches.

The trunk, like the root, conſiſts of three parts, viz. the bark, wood, and pith. Theſe parts, though ſubſtantially the ſame in the trunk as in the root, are in many caſes very different in their texture and appearance. The

Fig. 1.
Garden Bean.

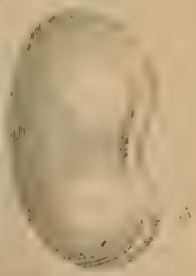


Fig. 2.

Fig. 3.

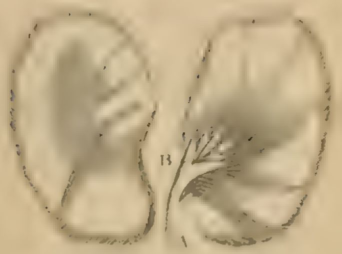


Fig. 4.

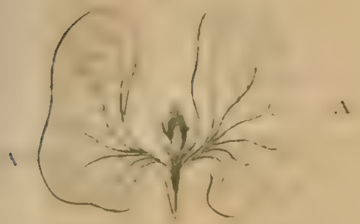


Fig. 5.
Slice of a Bean.

Fig. 6.
Radicle.

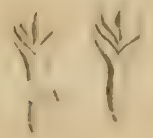


Fig. 7.
Plumula.

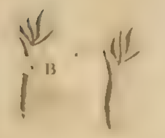


Fig. 8.

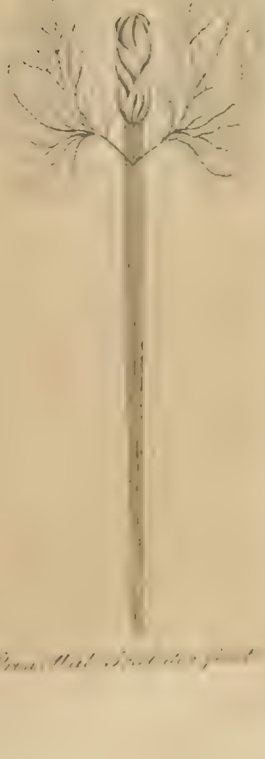


Fig. 9.
Wormwood Root cut transversely.

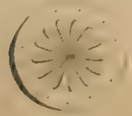
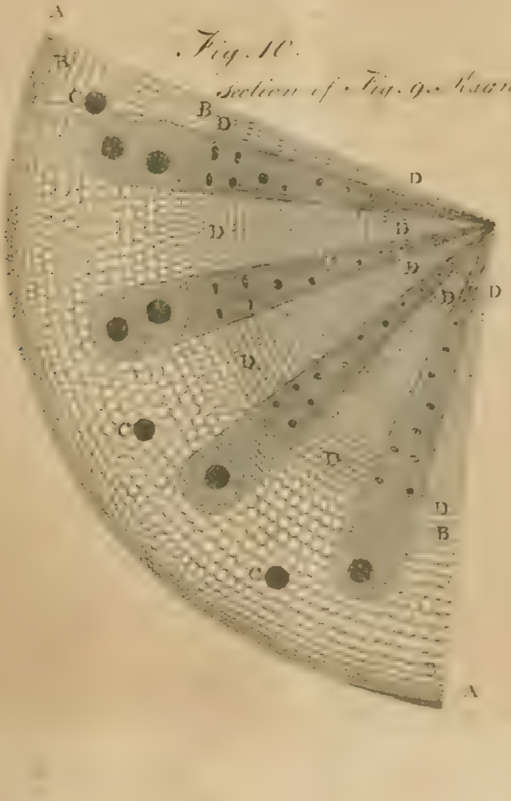


Fig. 10.
Section of Fig. 9. Magnified.



A. Bell Prin. Wal. Sculptor fecit.

Anatomy of PLANTS. Plate CCCCXXI.

Fig. 12.

Transverse Section of the Ash Branch Magnified.

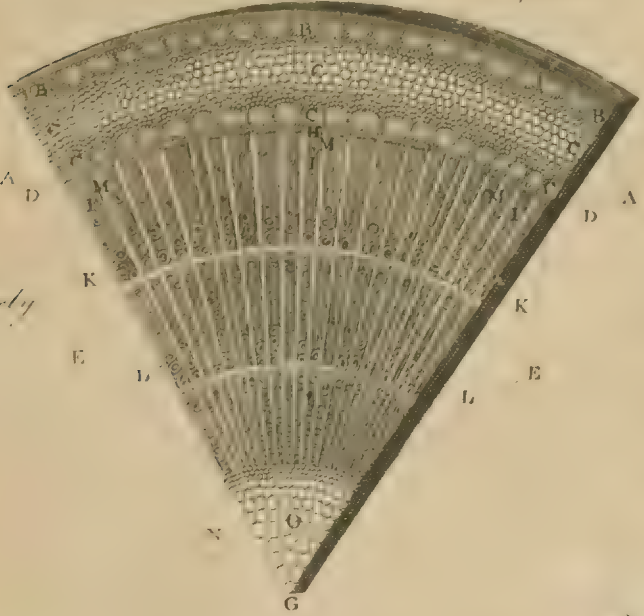


Fig. 11.

Ash Branch cut transversely

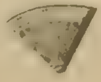


Fig. 14.

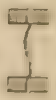


Fig. 15.

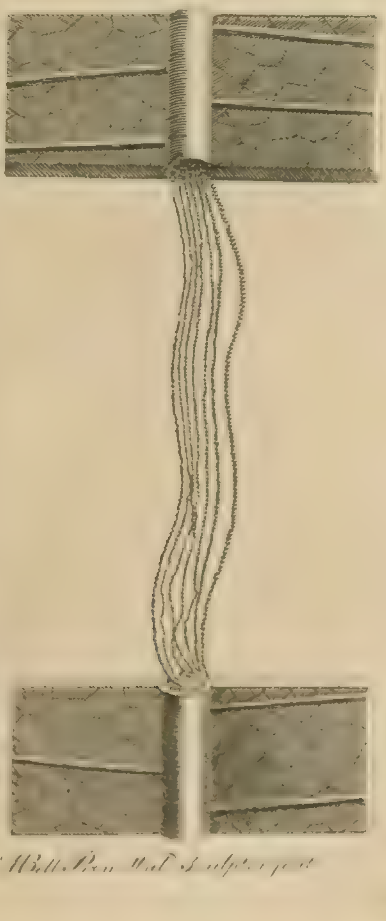


Fig. 13.

Vine Leaf.

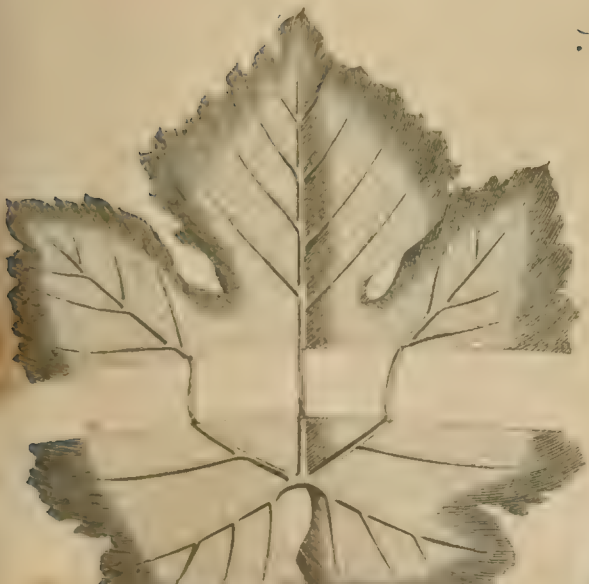


Fig. 16.

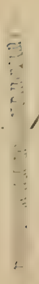


Fig. 16.

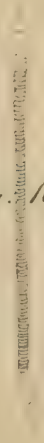
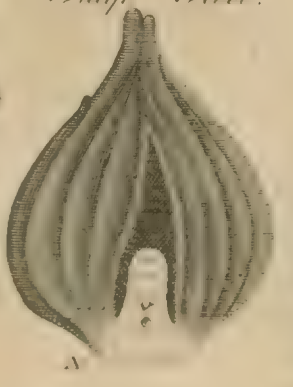


Fig. 17.

Tulip Root.



A. Bell Prin. Wal. Sculptor fecit

Fig. 18.

Pear cut transversely.

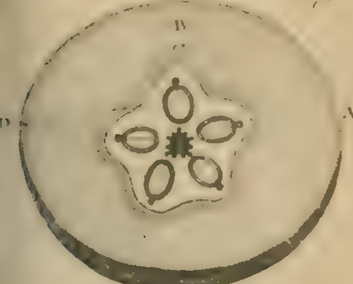


Fig. 19.

piece cut off fig. 18.

Fig. 21.

Pear cut Longitudinally.

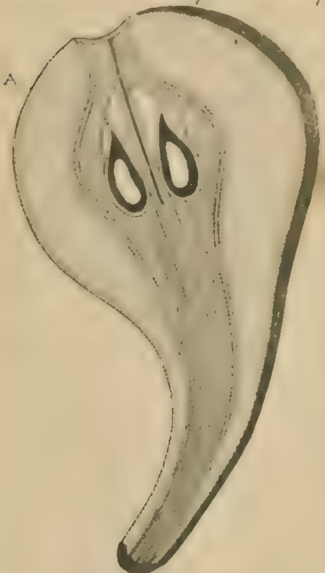


Fig. 20.

Fig. 19. magnified.

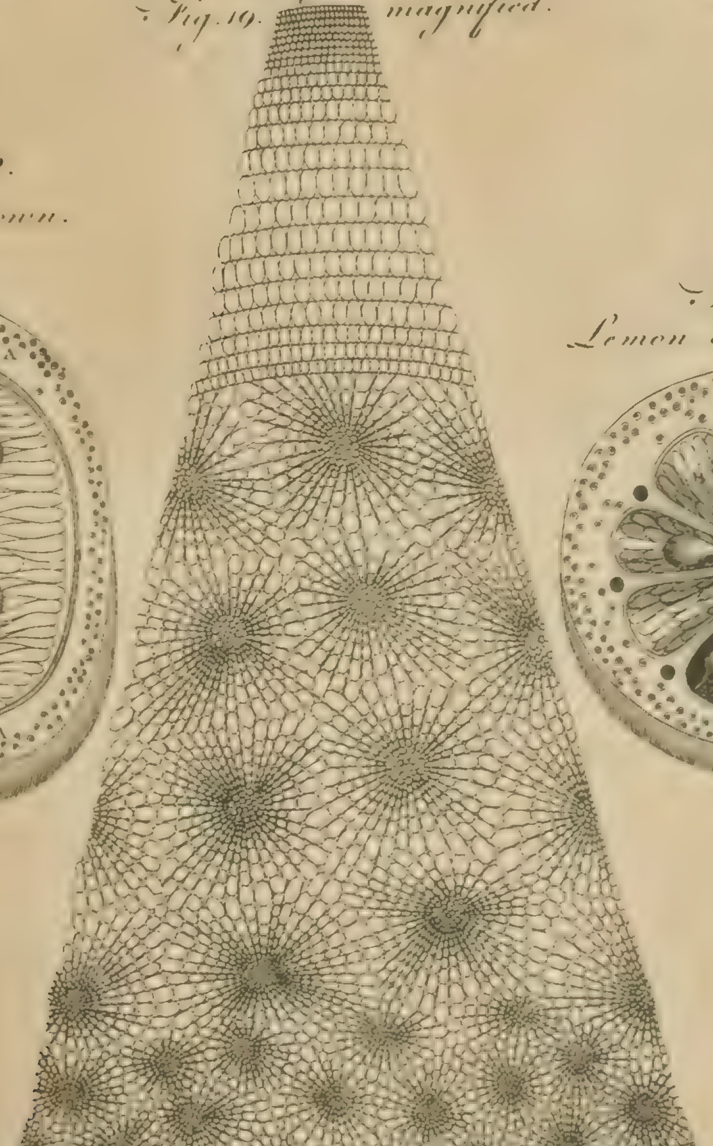


Fig. 22.

Lemon cut down.

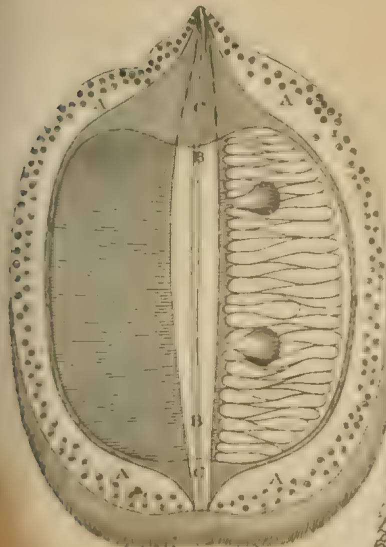
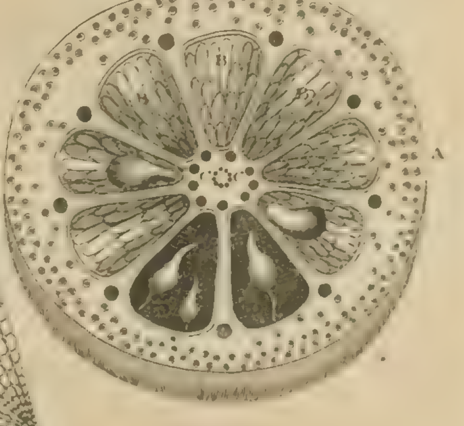


Fig. 23.

Lemon cut transversely.



A. Bell Prin. Wal. Sculptor fecit

Plant.

The ſkin of the bark is compoſed of very minute bladders, interſperſed with longitudinal woody fibres, as in the nettle, thiſtle, and moſt herbs. The outſide of the ſkin is viſibly porous in ſome plants, particularly the cane.

The principal body of the bark is compoſed of pulp or parenchyma, and innumerable veſſels much larger than thoſe of the ſkin. The texture of the pulpy part, though the ſame ſubſtance with the parenchyma in roots, yet ſeldom appears in the form of rays running towards the pith; and when theſe rays do appear, they do not extend above half-way to the circumference. The veſſels of the bark are very differently ſituated, and deſtined for various purpoſes in different plants. For example, in the bark of the pine, the innermoſt are lymph-ducts, and exceedingly ſmall; the outermoſt are gum or reſiniferous veſſels, deſtined for the ſecretion of turpentine; and are ſo large as to be diſtinctly viſible to the naked eye.

The wood lies between the bark and pith, and conſiſts of two parts, viz. a parenchymatous and a ligneous. In all trees, the parenchymatous part of the wood, though much diverſified as to ſize and conſiſtence, is uniformly diſpoſed in diametrical rays, or inſertions running betwixt ſimilar rays of the ligneous part.

The true wood is nothing but a congeries of old dried lymph-ducts. Between the bark and the wood a new ring of theſe ducts is formed every year, which gradually loſes its ſoftneſs as the cold ſeaſon approaches, and towards the middle of winter is condenſed into a ſolid ring of wood. Theſe annual rings, which are diſtinctly viſible in moſt trees when cut through, ſerve as natural marks to diſtinguiſh their age (fig. 11. 12.). The rings of one year are ſometimes larger, ſometimes leſs, than thoſe of another, probably owing to the favourableneſs or unfavourableneſs of the ſeaſon.

The pith, though of a different texture, is exactly of the ſame ſubſtance with the parenchyma of the bark, and the inſertions of the wood. The quantity of pith is various in different plants. Inſtead of being increaſed every year like the wood, it is annually diminiſhed, its veſſels drying up, and aſſuming the appearance and ſtructure of wood; inſomuch that in old trees there is ſcarce ſuch a thing as pith to be diſcerned.

A ring of ſap-veſſels is uſually placed at the outer edge of the pith, next the wood. In the pine, fig, and walnut, they are very large. The parenchyma of the pith is compoſed of ſmall cells or bladders, of the ſame kind with thoſe of the bark, only of a larger ſize. The general figure of theſe bladders is circular; though in ſome plants, as the thiſtle and borage, they are angular. Though the pith is originally one connected chain of bladders, yet as the plant grows old they ſhrivel, and open in different directions. In the walnut, after a certain age, it appears in the form of a regular tranſverſe hollow diviſion. In ſome plants it is altogether wanting; in others, as the ſonchus, nettle, &c. there is only a tranſverſe partition of it at every joint. Many other varieties might be mentioned; but theſe muſt be left to the obſervation of the reader.

Fig. 11. A tranſverſe ſection of a branch of aſh, as it appears to the eye.

Fig. 12. The ſame ſection magnified. AA, the bark. BBB, an arched ring of ſap-veſſels next the ſkin. CCC, the parenchyma of the bark with its cells, and another arched ring of ſap-veſſels. DD, a circular line of lymph-ducts immediately below the above arched ring. EE, the wood. F, the firſt year's growth. G, the ſecond. H, the third year's growth. II, the true wood. KK, the great air-veſſels. LL, the leſſer ones. MMM, the parenchymatous inſertions of the bark repreſented by the white rays. NO, the pith, with its bladders or cells.

4. *Of the Leaves.*] The leaves of plants conſiſt of the ſame ſubſtance with that of the trunk. They are full of nerves or woody portions, running in all directions, and branching out into innumerable ſmall threads, interwoven with the parenchyma like fine lace or gauze.

The ſkin of the leaf, like that of an animal, is full of pores, which both ſerve for perſpiration and for the abſorption of dews, air, &c. Theſe pores or orifices differ both in ſhape and magnitude in different plants, which is the cauſe of that variety of texture or grain peculiar to every plant.

The pulpy or parenchymatous part conſiſts of very minute fibres, wound up into ſmall cells or bladders. Theſe cells are of various ſizes in the ſame leaf.

All leaves, of whatever figure, have a marginal fibre, by which all the reſt are bounded. The particular ſhape of this fibre determines the figure of the leaf.

The veſſels of leaves have the appearance of inoſculating; but, when examined by the microſcope, they are found only to be interwoven or laid along each other.

What are called *air-veſſels*, or thoſe which carry no ſap, are viſible even to the naked eye in ſome leaves. When a leaf is ſlowly broken, they appear like ſmall woolly fibres, connected to both ends of the broken piece.

Plate CCCLXXI.

Fig. 13. The appearance of the air-veſſels to the eye, in a vine-leaf drawn gently aſunder.

Fig. 14. A ſmall piece cut off that leaf.

Fig. 15. The ſame piece magnified, in which the veſſels have the appearance of a ſcrew.

Fig. 16. The appearance of theſe veſſels as they exiſt in the leaf before they are ſtretched out.

5. *Of the Flower.*] It is needleſs here to mention any thing of the texture, or of the veſſels, &c. of flowers, as they are pretty ſimilar to thoſe of the leaf. It would be foreign to our preſent purpoſe to take any notice of the characters and diſtinctions of flowers. Theſe belong to the ſcience of Botany, to which the reader is referred.

There is one curious fact, however, which muſt not be omitted, viz. That every flower is perfectly formed in its parts many months before it appears outwardly; that is, the flowers which appear this year are not properly ſpeaking the flowers of this year, but of the laſt. For example, mezereon generally flowers in January; but theſe flowers were completely formed in the month of Auguſt preceding. Of this fact any one may ſatiſfy himſelf by ſeparating the coats of a tulip-root about the beginning of September; and he will find that the two innermoſt form a kind of cell, in the centre of which ſtands the young flower, which is not to make its appearance till the following April or May. Fig. 18. exhibits a view of the tulip-root when diſſected in September, with the young flower towards the bottom.

6. *Of the Fruit.*] In deſcribing the ſtructure of fruits,

a few examples ſhall be taken from ſuch as are moſt generally known.

A *pear*, beſides the ſkin, which is a production of the ſkin of the bark, conſiſts of a double parenchyma or pulp, ſap, and air-veſſels, calculary and acetary.

The outer parenchyma is the ſame ſubſtance continued from the bark, only its bladders are larger and more ſucculent.

It is everywhere interſperſed with ſmall globules or grains, and the bladders reſpect theſe grains as a kind of centres, every grain being the centre of a number of bladders. The ſap and air-veſſels in this pulp are extremely ſmall.

Next the core is the inner pulp or parenchyma, which conſiſts of bladders of the ſame kind with the outer, only larger and more oblong, correſponding to thoſe of the pulp, from which it ſeems to be derived. This inner pulp is much ſourer than the other, and has none of the ſmall grains interſperſed through it; and hence it has got the name of *acetary*.

Between the acetary and outer pulp, the globules or grains begin to grow larger, and gradually unite into a hard ſtony body, eſpecially towards the corculum or ſtool of the fruit; and from this circumſtance it has been called the *calculary*.

Theſe grains are not derived from any of the organical parts of the tree; but ſeem rather to be a kind of concretions precipitated from the ſap, ſimilar to the precipitation from wine, urine, and other liquors.

The core is a roundiſh cavity in the centre of the pear, lined with a hard woody membrane, in which the ſeed is incloſed. At the bottom of the core there is a ſmall duct or canal, which runs up to the top of the pear; this canal allows the air to get into the core, for the purpoſe of drying and ripening the ſeeds.

Fig. 18. a tranſverſe ſection of a pear, as it appears to the naked eye. A, the ſkin, and a ring of ſap-veſſels. B, the outer parenchyma, or pulp, with its veſſels, and ligneous fibres interſperſed. C, the inner parenchyma, or acetary, with its veſſels, which are larger than the outer one. D, the core and ſeeds.

Fig. 19. a piece cut off, fig. 19.

Fig. 20. is fig. 19. magnified. A A A, the ſmall grains or globules, with the veſſels radiated from them.

Fig. 21. a longitudinal ſection of the pear, ſhowing a different view of the ſame parts with thoſe of fig. 18. A the channel, or duct, which runs from the top of the pear to the bottom of the core.

In a *lemon*, the parenchyma appears in three different forms. The parenchyma of the rind is of a coarſe texture, being compoſed of thick fibres, woven into large bladders. Thoſe neareſt the ſurface contain the eſſential oil of the fruit, which burſts into a flame when the ſkin is ſqueezed over a candle. From this outmoſt parenchyma nine or ten inſertions or lamellæ are produced, which run between as many portions of the pulp, and unite into one body in the centre of the fruit, which correſponds to the pith in trunks or roots. At the bottom and top of the lemon, this pith evidently joins with the rind, without the intervention of any lamellæ. This circumſtance ſhows, that the pith and bark are actually connected in the trunk and roots of plants, though it is difficult to demonſtrate the connection, on account of the cloſeneſs of their texture, and the minuteneſs of their fibres. Many veſſels are diſperſed through the whole of this parenchyma; but the largeſt ones ſtand on the inner edge of the rind, and the outer edge of the pith, juſt at the two extremities of each lamella.

The ſecond kind of parenchyma is placed between the rind and the pith; is divided into diſtinct bodies by the lamellæ; and each of theſe bodies forms a large bag.

Theſe bags contain a third parenchyma, which is a cluſter of ſmaller bags, diſtinct and unconnected with each other, having a ſmall ſtalk by which they are fixed to the large bag. Within each of theſe ſmall bags are many hundreds of bladders, compoſed of extremely minute fibres. Theſe bladders contain the acid juice of the lemon.

Fig. 22. a longitudinal ſection of a lemon. A A A, the rind with the veſſels which contain the eſſential oil. B B, the ſubſtance correſponding to the pith, formed by the union of the lamellæ or inſertions. C C, its continuation and connection with the rind, independent of the inſertions.

Fig. 23. a tranſverſe ſection of the lemon. B B B, &c. the nine pulpy bags, or ſecond parenchyma, placed between the rind and the pith; and the cluſter of ſmall bags, which contain the acid juice, incloſed in the large ones. C C, the large veſſels that ſurround the pith. D D, two of the large bags laid open, ſhowing the ſeeds, and their connection with the lamellæ or membranes which form the large bags.

Of the Perſpiration of PLANTS, *and the quantity of moiſture daily imbibed by them.*—Theſe curious particulars have been determined with great accuracy by Dr Hales. The method he took to accompliſh his purpoſe was as follows.—In the month of July, commonly the warmeſt ſeaſon of the year, he took a large ſun-flower three feet and an half high, which had been purpoſely planted in a flower-pot when young. He covered the pot with thin milled lead, leaving only a ſmall hole to preſerve a communication with the external air, and another by which he might occaſionally ſupply the plant with water. Into the former he inſerted a glaſs tube nine inches long, and another ſhorter tube into the hole by which he poured in the water; and the latter was kept cloſe ſtopped with a cork, except when there was occaſion to uſe it. The holes in the bottom of the pot were alſo ſtopped up with corks, and all the crevices ſhut with cement.—Things being thus prepared, the pot and plant were weighed for 15 ſeveral days; after which the plant was cut off cloſe to the leaden plate, and the ſtump well covered with cement. By weighing, he found that there perſpired through the unglazed porous pot two ounces every 12 hours; which being allowed for in the daily weighing of the plant and pot, the greateſt perſpiration, in a warm day, was found to be one pound 14 ounces; the middle rate of perſpiration, one pound four ounces; the perſpiration of a dry warm night, without any ſenſible dew, was about three ounces; but when there was any ſenſible though ſmall dew, the perſpiration was nothing; and when there was a large dew, or ſome little rain in the night, the plant and pot was increaſed in weight two or three ounces.

In order to know what quantity was perſpired from a ſquare inch of ſurface, our author cut off all the leaves of the plant, and laid them in five ſeveral parcels, according to their ſeveral ſizes; and then meaſured the ſurface of a leaf of each parcel, by laying over it a large lattice made with threads, in which each of the little ſquares was $\frac{1}{4}$ of an inch; by numbering of which, he had the ſurface of the leaves in ſquare inches; which, multiplied by the number of leaves in the correſponding parcels, gave the area of all the leaves. By this method he found the ſurface of the whole plant above ground to be 5616 ſquare inches, or 39 ſquare feet. He dug up another ſun-flower of nearly the ſame ſize, which had eight main roots, reaching 15 inches deep and ſidewiſe, from the ſtem. It had beſides a very thick buſh of lateral roots from the eight main roots, extending every way in a hemiſphere about nine inches from the ſtem and main roots. In order to eſtimate the length of all the roots, he took one of the main roots with its laterals, and meaſured and weighed them; and then weighed the other ſeven with their laterals; by which means he found the ſum of all their lengths to be 1448 feet. Suppoſing then the periphery of theſe roots at a medium to be 0.131 of an inch, then their ſurface will be 2276 ſquare inches, or 15.8 ſquare feet; that is, equal to 0.4 of the ſurface of the plant above ground. From calculations drawn from theſe obſervations, it appears, that a ſquare inch of the upper ſurface of this plant perſpires $\frac{1}{165}$ part of an inch in a day and a night; and that a ſquare inch of the ſurface underground imbibed $\frac{1}{67}$ of an inch in the ſame time.

The quantity perſpired by different plants, however, is by no means equal. A vine-leaf perſpires only $\frac{1}{191}$ of an inch in 12 hours; a cabbage perſpires $\frac{1}{80}$ of an inch in the ſame time; an apple-tree $\frac{1}{102}$ in 12 hours; and a lemon $\frac{1}{248}$ in 12 hours.

Of the circulation of the Sap in PLANTS.—Concerning this there have been great diſputes; ſome maintaining, that the vegetable ſap has a circulation analogous to the blood of animals; while others affirm, that it only aſcends in the day-time, and deſcends again in the night. In favour of the doctrine of circulation it has been urged, that upon making a tranſverſe inciſion into the trunk of a tree, the juice which runs out proceeds in greater quantity from the upper than the lower part; and the ſwelling in the upper lip is alſo much greater than in the lower. It appears, however, that when two ſimilar inciſions are made, one near the top and the other near the root, the latter expends much more ſap than the former. Hence it is concluded, that the juice aſcends by one ſet of veſſels and deſcends by another. But, in order to ſhow this clearly, it would be neceſſary firſt to prove that there is in plants, as in animals, ſome kind of centre from which the circulation begins, and to which it returns; but no ſuch centre has been diſcovered by any naturaliſt; neither is there the leaſt proviſion apparently made by nature whereby the ſap might be prevented from deſcending in the very ſame veſſels through which it aſcends. In the lacteal veſſels of animals, which we may ſuppoſe to be analogous to the roots of vegetables, there are valves which effectually prevent the chyle when once abſorbed from returning into the inteſtines; but no ſuch thing is obſerved in the veſſels of vegetables; whence it muſt be very probable, that when the propolling force ceaſes, the juice deſcends by the very ſame veſſels through which it aſcended.—This matter, however, has been cleared up almoſt as well as the nature of the ſubject will admit of by the experiments of Dr Hales †. Theſe experiments are ſo numerous, that for a particular account of them we muſt refer to the work itſelf; however, his reaſoning againſt the circulation of the ſap will be ſufficiently intelligible without them. "We ſee (ſays he), in many of the foregoing experiments, what quantities of moiſture trees daily imbibe and perſpire: now the celerity of the ſap muſt be very great, if that quantity of moiſture muſt, moſt of it, aſcend to the top of the tree, then deſcend, and aſcend again, before it is carried off by perſpiration.

"The defect of a circulation in vegetables ſeems in ſome meaſure to be ſupplied by the much greater quantity of liquor, which the vegetable takes in, than the animal, whereby its motion is accelerated; for we find the ſun-flower, bulk for bulk, imbibes and perſpires 17 times more freſh liquor than a man, every 24 hours.

"Beſides, Nature's great aim in vegetables being only that the vegetable life be carried on and maintained, there was no occaſion to give its ſap the rapid motion which was neceſſary for the blood of animals.

"In animals, it is the heart which ſets the blood in motion, and makes it continually circulate; but in vegetables we can diſcover no other cauſe of the ſap's motion but the ſtrong attraction of the capillary ſap-veſſels, aſſiſted by the briſk undulations and vibrations cauſed by the ſun's warmth, whereby the ſap is carried up to the top of the talleſt trees, and is there perſpired off through the leaves: but when the ſurface of the tree is greatly diminiſhed by the loſs of its leaves, then alſo the perſpiration and motion of the ſap is proportionably diminiſhed, as is plain from many of the foregoing experiments: ſo that the aſcending velocity of the ſap is principally accelerated by the plentiful perſpiration of the leaves, thereby making room for the fine capillary veſſels to exert their vaſtly attracting power, which perſpiration is effected by the briſk rarefying vibrations of warmth; a power that does not ſeem to be any ways well adapted to make the ſap deſcend from the tops of vegetables by different veſſels to the root.

"If the ſap circulated, it muſt needs have been ſeen deſcending from the upper part of large gaſhes cut in branches ſet in water, and with columns of water preſſing on their bottoms in long glaſs tubes. In both which caſes it is certain that great quantities of water paſſed through the ſtem, ſo that it muſt needs have been ſeen deſcending, if the return of the ſap downwards were by truſion or pulſion, whereby the blood in animals is returned through the veins to the heart; and that pulſion if there were any, muſt neceſſarily be exerted with prodigious force, to be able to drive the ſap through the finer capillaries. So that, if there be a return of the ſap downwards, it muſt be by attraction, and that a very powerful one, as we may ſee by many of theſe experiments. But it is hard to conceive what and where that power is which can be equivalent to that proviſion nature has made for the aſcent of the ſap in conſequence of the great perſpiration of the leaves.

"The inſtances of the jeſſamine-tree, and of the paſſion-tree, have been looked upon as ſtrong proofs of the circulation of the ſap, becauſe their branches, which were far below the inoculated bud, were gilded: but we have many viſible proofs in the vine, and other bleeding trees, of the ſap's receding back, and puſhing forwards alternately, at different times of the day and night. And there is great reaſon to think that the ſap of all other trees, has ſuch an alternate, receding, and progreſſive motion, occaſioned by the alternacies of day and night, warm and cool, moiſt and dry.

† Vegetable Staticks, vol. p. 142.

"For the ſap in all vegetables does probably recede in ſome meaſure from the tops of the branches, as the ſun leaves them; becauſe its rarefying power then ceaſing, the greatly rarefied ſap, and air mixed with it, will condenſe, and take up leſs room than they did, and the dew and rain will then be ſtrongly imbibed by the leaves; whereby the body and branches of the vegetable which have been much exhauſted by the great evaporation of the day, may at night imbibe ſap and dew from the leaves; for by ſeveral experiments, plants were found to increaſe conſiderably in weight, in dewy and moiſt nights. And by other experiments on the vine, it was found that the trunk and branches of vines were always in an imbibing ſtate, cauſed by the great perſpiration of the leaves, except in the bleeding ſeaſon; but when at night that perſpiring power ceaſes, then the contrary imbibing power will prevail, and draw the ſap and dew from the leaves, as well as moiſture from the roots.

"And we have a farther proof of this by fixing mercurial gages to the ſtems of ſeveral trees which do not bleed, whereby it is found that they are always in a ſtrongly imbibing ſtate, by drawing up the mercury ſeveral inches: whence it is eaſy to conceive, how ſome of the particles of the gilded bud in the inoculated jeſſamine may be abſorbed by it, and thereby communicate their gilding miaſma to the ſap of other branches; eſpecially when, ſome months after the inoculation, the ſtock of the inoculated jeſſamine is cut off a little above the bud; whereby the ſtock, which was the counteracting part to the ſtem, being taken away, the ſtem attracts more vigorouſly from the bud.

"Another argument for the circulation of the ſap is, that ſome ſorts of the graffs will infect and canker the ſtocks they are grafted on: but by mercurial gages fixed to freſh-cut ſtems of trees, it is evident that thoſe ſtems were in a ſtrongly imbibing ſtate; and conſeqently the cankered ſtocks might very likely draw ſap from the graff, as well as the graff alternately from the ſtock; juſt in the ſame manner as leaves and branches do from each other, in the viciſſitudes of day and night. And this imbibing power of the ſtock is ſo great, where only ſome of the branches of a tree are grafted, that the remaining branches of the ſtock will, by their ſtrong attraction, ſtarve thoſe graffs; for which reaſon it is uſual to cut off the greateſt part of the branches of the ſtock, leaving only a few ſmall ones to draw up the ſap.

"The inſtance of the ilex grafted upon the Engliſh oak, ſeems to afford a very conſiderable argument againſt a circulation. For, if there were a free uniform circulation of the ſap through the oak and ilex, why ſhould the leaves of the oak fall in winter, and not thoſe of the ilex?

"Another argument againſt an uniform circulation of the ſap in trees, as in animals, may be drawn from an experiment, where it was found by the three mercurial gages fixed to the ſame vine, that while ſome of its branches changed their ſtate of protruding ſap into a ſtate of imbibing, others continued protruding ſap; one nine, and the other thirteen days longer."

To this reaſoning of Dr Hales we ſhall ſubjoin an experiment made by Mr Muſtel of the Academy of Sciences at Rouen, which ſeems deciſive againſt the doctrine of circulation. His account of it is as follows.—"On the 12th of January I placed ſeveral ſhrubs in pots againſt the windows of my hot-houſe, ſome within the houſe and others without it. Through holes made for this purpoſe in the panes of glaſs, I paſſed a branch of each of the ſhrubs, ſo that thoſe in the inſide had a branch without, and thoſe on the outſide one within: after this, I took care that the holes ſhould be exactly cloſed and luted. This inverſe experiment, I thought, if followed cloſely, could not fail affording ſufficient points of compariſon, to trace out the differences, by the obſervation of the effects.

"The 20th of January, a week after this diſpoſition, all the branches that were in the hot-houſe began to diſcloſe their buds. In the beginning of February there appeared leaves; and towards the end of it, ſhoots of a conſiderable length, which preſented the young flowers. A dwarf apple-tree, and ſeveral roſe-trees, being ſubmitted to the ſame experiment, ſhowed the ſame appearance then as they commonly put on in May; in ſhort, all the branches which were within the hot-houſe, and conſequently kept in the warm air, were green at the end of February, and had their ſhoots in great forwardneſs. Very different were thoſe parts of the ſame tree which were without and expoſed to the cold. None of theſe gave the leaſt ſign of vegetation; and the froſt, which was intenſe at that time, broke a roſe-pot placed on the outſide, and killed ſome of the branches of that very tree which, on the inſide, was every day putting forth more and more ſhoots, leaves, and buds, ſo that it was in full vegetation on one ſide, whilſt frozen on the other.

"The continuance of the froſt occaſioned no change in any of the internal branches. They all continued in a very briſk and verdant ſtate, as if they did not belong to the tree which, on the outſide, appeared in the ſtate of the greateſt ſuffering. On the 15th of March, notwithſtanding the ſeverity of the ſeaſon, all was in full bloom. The apple-tree had its root, its ſtem, and part of its branches, in the hot-houſe. Theſe branches were covered with leaves and flowers; but the branches of the ſame tree, which were carried on the outſide, and expoſed to the cold air, did not in the leaſt partake of the activity of the reſt, but were abſolutely in the ſame ſtate which all trees are in during winter. A roſe-tree, in the ſame poſition, ſhowed long ſhoots with leaves and buds; it had even ſhot a vigorous branch upon its ſtalk; whilſt a branch which paſſed through to the outſide had not begun to produce any thing, but was in the ſame ſtate with other roſe-trees left in the ground. This branch is four lines in diameter, and 18 inches high.

"The roſe-tree on the outſide was in the ſame ſtate; but one of its branches drawn through to the inſide of the hot-houſe was covered with leaves and roſe-buds. It was not without aſtoniſhment that I ſaw this branch ſhoot as briſkly as the roſe-tree which was in the hot-houſe, whoſe roots and ſtalk, expoſed as they were to the warm air, ought, it ſhould ſeem, to have made it get forwarder than a branch belonging to a tree, whoſe roots, trunk, and all its other branches, were at the very time froſt-nipped. Notwithſtanding this, the branch did not ſeem affected by the ſtate of its trunk; but the action of the heat upon it produced the ſame effect as if the whole tree had been in the hot-houſe."

Of the Perpendicularity of PLANTS.—This is a curious phenomenon in natural hiſtory, which was firſt obſerved by M. Dodart, and publiſhed in an eſſay on the affectation

Memoires de l'Acad. Royal des Sciences. an. 1708.

affectation of perpendicularity obſerved in the ſtems or ſtalks of all plants, in the roots of many, and even in their branches, as much as poſſible. Though almoſt all plants riſe a little crooked, yet the ſtems ſhoot up perpendicularly, and the roots ſink down perpendicularly: even thoſe, which by the declivity of the ſoil come out inclined, or thoſe which are diverted out of the perpendicular by any violent means, again redreſs and ſtraighten themſelves and recover their perpendicularity, by making a ſecond and contrary bend or elbow without rectifying the firſt. We commonly look upon this affectation without any ſurpriſe; but the naturaliſt who knows what a plant is, and how it is formed, finds it a ſubject of aſtoniſhment.

Every ſeed we know contains in it a little plant, already formed, and needing nothing but to be unfolded; the little plant has its root; and the pulp, which is uſually ſeparated into two lobes, is the foundation of the firſt food it draws by its root when it begins to germinate. If a ſeed in the earth therefore be diſpoſed ſo as that the root of the little plant be turned downwards, and the ſtem upwards, and even perpendicularly upwards, it is eaſy to conceive that the little plant coming to unfold itſelf, its ſtalk and root need only follow the direction they have to grow perpendicularly. But we know that the ſeeds of plants, whether ſown of themſelves or by man, fall in the ground at random; and among the great variety of ſituations with regard to the ſtalk of their plant, the perpendicular one upwards is but one. In all the reſt, therefore, it is neceſſary that the ſtalk rectify itſelf, ſo as to get out of the ground: but what force effects this change, which is unqueſtionably a violent action? Does the ſtalk find a leſs load of earth above it, and therefore go naturally that way where it finds the leaſt obſtacle? Were this ſo, the little root, when it happens to be uppermoſt, muſt alſo follow that direction, and mount up.

To account for two ſuch different actions, M. Dodart ſuppoſes that the fibres of the ſtalks are of ſuch a nature as to be contracted and ſhortened by the heat of the ſun, and lengthened out by the moiſture of the earth; and, on the contrary, that the fibres of the roots are contracted by the moiſture of the earth, and lengthened by the heat of the ſun. When the plantule therefore is inverted, and the root at the top, the fibres which compoſe one of the branches of the root are not alike expoſed to the moiſture of the earth, the lower part being more expoſed than the upper. The lower muſt of courſe contract the moſt; and this contraction is again promoted by the lengthening of the upper, whereon the ſun acts with the greateſt force. This branch of the root muſt therefore recoil towards the earth, and, inſinuating through the pores thereof, muſt get underneath the bulb, &c. By inverting this reaſoning we diſcover how the ſtalk comes to get uppermoſt.

We ſuppoſe then that the earth attracts the root to itſelf, and that the ſun contributes to its deſcent: and, on the other hand, that the ſun attracts the ſtem, and the earth contributes to ſend it towards the ſame. With regard to the ſtraightening of the ſtalks in the open air, M. Dodart imagines that it ariſes from the impreſſion of external cauſes, particularly the ſun and rain. For the lower part of a ſtalk that is bent is more expoſed to the rain, dew, and even the ſun, &c. than the upper; and there is a certain ſtructure of the fibres, both equally tend to ſtraighten the part moſt expoſed by the ſhortening they ſucceſſively occaſion in it; for moiſture ſhortens by ſwelling and heat by diſſipating. What that ſtructure is which gives the fibres ſuch different properties, or whereon it depends, is a myſtery as yet beyond our depth.

M. de la Hire accounts for the perpendicularity of the ſtems or ſtalks of plants in this manner: he ſuppoſes that the root of plants draws a coarſer and heavier juice, and the ſtem and branches a finer and more volatile one. Moſt naturaliſts indeed conceive the root to be the ſtomach of the plant, where the juices of the earth are ſubtilized ſo as to become able to riſe through the ſtem to the extremity of the branches. This difference of juices ſuppoſes larger pores in the roots than the ſtalk, &c. and, in a word, a different contexture. This difference muſt be found even in the little inviſible plant incloſed in the ſeed: in it, therefore, we may conceive a point of ſeparation; ſuch as, that all on one ſide, for example the root, ſhall be unfolded by the groſſer juices, and all on the other ſide by the more ſubtile ones. Suppoſe the plantule, when its parts begin to unfold, to be entirely inverted, the root at the top, and the ſtalk below; the juices entering the root will be coarſeſt, and when they have opened and enlarged the pores ſo as to admit juices of a determinate weight, thoſe juices preſſing the root more and more will drive it downwards; and this will increaſe as the root is more extended or enlarged: for the point of ſeparation being conceived as the fixed point of a lever, they will act by the longer arm. The volatile juices at the ſame time having penetrated the ſtalk, will give it a direction from below upwards; and, by reaſon of the lever, will give it more and more every day. The little plant is thus turned on its fixed point of ſeparation till it become perfectly erect.

When the plant is thus erected, the ſtalk ſhould ſtill riſe perpendicularly, in order to give it the more firm biding, and enable it to withſtand the injuries of wind and weather. M. Parent thus accounts for this effect: If the nutritious juice which arrived at the extremity of a riſing ſtalk evaporate, the weight of the air which encompaſſes it on all ſides will make it aſcend vertically: but if, inſtead of evaporating, it congeal, and remain fixed to that extremity whence it was ready to go off, the weight of the air will give it the ſame direction; ſo that the ſtalk will have acquired a ſmall new part vertically laid over it, juſt as the flame in a candle held in any way obliquely to the horizon ſtill continues vertical by the preſſure of the atmoſphere. The drops of juice that ſucceed will follow the ſame direction; and as all together form the ſtalk, that muſt of courſe be vertical, unleſs ſome particular circumſtance intervene.

The branches, which are at firſt ſuppoſed to proceed laterally out of the ſtalk in the firſt embryo of the plant, though they ſhould even come out in an oblique direction, muſt alſo riſe themſelves upwards by the conſtant direction of the nutritious juice, which at firſt ſcarcely meets any reſiſtance in a tender ſupple branch; and afterwards, even though the branch grow more firm, it will act with the more advantage; ſince the branch, being become longer, furniſhes it with a longer arm or lever. The ſlender action of even a little drop becomes very conſiderable by its continuity, and by the aſſiſtance of ſuch circumſtances. Hence may we account for that regular ſituation and direction of the branches, ſince they all make nearly the ſame conſtant angle of 45° with the ſtem, and with one another.

M. Aſtruc accounts for the perpendicularity of the ſtems, and their redreſſing themſelves, thus: 1. He thinks the nutritious juice ariſes from the circumference of the plant, and terminates in the pith: And, 2. That fluids, contained in tubes either parallel or oblique to the horizon, gravitate on the lower part of the tubes, and not at all on the upper. Hence it follows, that, in a plant placed either obliquely or parallel to the horizon, the nutritious juice will act more on the lower part of the canals than on the upper; and by this means they will inſinuate more into the canals communicating therewith, and be collected more copiouſly therein: thus the parts on the lower ſide will receive more accretion and be more nouriſhed than thoſe on the upper, the extremity of the plant will therefore be obliged to bend upwards.

This principle brings the ſeed into its due ſituation at firſt. In a bean planted upſide down, the plume and radicle may be ſeen with the naked eye ſhooting at firſt directly for about an inch; after which they begin to bend, the one downward, and the other upward. The ſame is the caſe in a heap of barley to be made into malt, or in a quantity of acorns laid to ſprout in a moiſt place, &c. Each grain of barley and each acorn has a different ſituation; and yet every ſprout tends directly upward, and every root downward, and the curvity or bend they make is greater or leſs as their ſituation approaches more or leſs to the direction wherein no curvature at all would be neceſſary. But two ſuch oppoſite motions cannot poſſibly ariſe without ſuppoſing ſome difference between the two parts: the only one we know of is, that the plume is fed by a juice imported to it by tubes parallel to its ſides, whereas the radicle imbibes its nouriſhment at every pore in its ſurface. When the plume therefore is either parallel or inclined to the horizon, the nutritious juice, feeding the lower parts more than the upper, will determine its extremes to turn upward, for the reaſons before given. On the contrary, when the radicle is in the like ſituation, the nutritious juice penetrating through the upper part more copiouſly than through the under, there will be a greater accretion of the former than of the latter; and the radicle will therefore be bent downwards, and this mutual curvity of the plume and radicle muſt continue till ſuch time as their ſides are nouriſhed alike, which cannot be till they are perpendicular.

Of the Food of PLANTS.—This hath been ſo fully diſcuſſed under the article AGRICULTURE, that little remains to be ſaid upon the ſubject in this place. The method of making dephlogiſticated or vital air *de novo*, is now ſo much improved, that numberleſs experiments may be made with it both on animals and vegetables. It appears, indeed, that theſe two parts of the creation are a kind of counterbalance to one another; and the noxious parts or excrements of the one prove ſalutary food to the other. Thus, from the animal body continually paſs off certain effluvia, which vitiate or *phlogiſticate* the air. Nothing can be more prejudicial to animal life than an accumulation of theſe effluvia: on the other hand, nothing is more favourable to vegetables than thoſe excrementitious effluvia of animals; and accordingly they greedily abſorb them from the earth, or from the air. With reſpect to the excrementitious parts of living vegetables, the caſe is reverſed. The pureſt air is the common effluvium which paſſes off from vegetables; and this, however favourable to animal life, is by no means ſo to vegetable; whence we have an additional proof of the doctrine concerning the food of plants delivered under the article AGRICULTURE.

With regard to the effects of other kinds of air on vegetation, a difference of ſome conſequence took place between Dr Prieſtley and Dr Percival. The former, in the firſt volume of his Experiments and Obſervations on Air, had aſſerted that fixed air is fatal to vegetable as well as to animal life. This opinion, however, was oppoſed by Dr Percival, and the contrary one adopted by Dr Hunter of York in the Georgical Eſſays, vol. v. The experiments related by theſe two gentlemen would indeed have been deciſive, had they been made with ſufficient accuracy. That this was the caſe, however, Dr Prieſtley denies; and in the 3d volume of his Treatiſe on Air has fully detected the miſtakes in Dr Percival's Experiments; which proceeded in fact from his having uſed, not fixed air, but common air mixed with a ſmall quantity of fixed air. His experiments, when repeated with the pureſt fixed air, and in the moſt careful manner, were always attended with the ſame effect, namely, the killing of the plant.

It had alſo been aſſerted by Drs Percival and Hunter, that water impregnated with fixed air was more favourable to vegetation than ſimple water. This opinion was likewiſe examined by Dr Prieſtley: however, his experiments were indeciſive; but ſeem rather unfavourable to the uſe of fixed air than otherwiſe.

Another very remarkable fact with regard to the food of plants has been diſcovered by Dr Prieſtley; namely, that ſome of them, ſuch as the willow, comfrey, and duckweed, are nouriſhed by inflammable air. The firſt, he ſays, flouriſhes in this ſpecies of air ſo remarkably, that, "it may be ſaid to feed upon it with great avidity. This proceſs terminates in the change of what remains of the inflammable air into phlogiſticated air, and ſometimes into a ſpecies of air as good as common air, or even better; ſo that it muſt be the *inflammable principle* in the air that the plant takes, converting it, no doubt, into its proper nouriſhment."

Prieſtley on Air, vol. v. p. 1.

What the followers of Stahl call phlogiſticated air and inflammable air, are ſo cloſely allied to each other, that it is no wonder they ſhould ſerve promiſcuouſly for the food of plants. The reaſon why both are not agreeable to all kinds of plants, moſt probably is the different quantity of phlogiſtic matter contained in them, and the different action of the latent fire they contain; for all plants do not require an equal quantity of nouriſhment; and ſuch as require but little, will be deſtroyed by having too much. The action of heat alſo is eſſentially neceſſary to vegetation; and it is probable that very much of this principle is abſorbed from the air by vegetables. But if the air by which plants are partly nouriſhed contains too much of that principle, it is very probable that they may be deſtroyed from this cauſe as well as the other; and thus inflammable air, which contains a vaſt quantity of that active principle, may deſtroy ſuch plants as grow in a dry ſoil, though it preſerves thoſe which grow in a wet one. See VEGETATION.

Diſſemination of PLANTS.—So great are the prolific powers of the vegetable kingdom, that a ſingle plant almoſt of any kind, if left to itſelf, would, in a ſhort time, overrun the whole world. Indeed, ſuppoſing the plant to have been only a ſingle annual, with two ſeeds, it would, in 20 years, produce more than a million of its own ſpecies; what numbers then muſt have been produced by a plant whoſe ſeeds are ſo numerous as many of thoſe with which we are acquainted? In that part of our work we have given particular examples of the very prolific nature of plants, which we need not repeat here; and we have made ſome obſervations on the means by which they are carried to diſtant places. This is a very curious matter of fact, and as ſuch we ſhall now give a fuller account of it.

If nature had appointed no means for the ſcattering of theſe numerous ſeeds, but allowed them to fall down in the place where they grew, the young vegetables muſt of neceſſity have choked one another as they grew up, and not a ſingle plant could have arrived at perfection. But ſo many ways are there appointed for the diſſemination of plants, that we ſee they not only do not hinder each others growth, but a ſingle plant will in a ſhort time ſpread through different countries. The moſt evident means for this purpoſe are,

1. The force of the air.—That the efficacy of this may be the greater, nature has raiſed the ſeeds of vegetables upon ſtalks, ſo that the wind has thus an opportunity of acting upon them with the greater advantage. The ſeed-capſules alſo open at the apex, leſt the ripe ſeeds ſhould drop out without being widely diſperſed by the wind. Others are furniſhed with wings, and a pappous down, by which, after they come to maturity, they are carried up into the air, and have been known to fly the diſtance of 50 miles: 138 genera are found to have winged ſeeds.

2. In ſome plants the ſeed-veſſels open with violence when the ſeeds are ripe, and thus throw them to a conſiderable diſtance; and we have an enumeration of 50 genera whoſe ſeeds are thus diſperſed.

3. Other ſeeds are furniſhed with hooks, by which, when ripe, they adhere to the coats of animals, and are carried by them to their lodging places. Linnæus reckons 50 genera armed in this manner.

4. Many ſeeds are diſperſed by means of birds and other animals; who pick up the berries, and afterwards eject the ſeeds uninjured. Thus the fox diſſeminates the privet, and man many ſpecies of fruit. The plants found growing upon walls and houſes, on the tops of high rocks, &c. are moſtly brought there by birds; and it is univerſally known, that by manuring a field with new dung, innumerable weeds will ſpring up which did not exiſt there before: 193 ſpecies are reckoned up which may be diſſeminated in this manner.

5. The growth of other ſeeds is promoted by animals in a different way. While ſome are eaten, others are ſcattered and trodden into the ground by them. The ſquirrel gnaws the cones of the pine, and many of the ſeeds fall out. When the loxia eats off their bark, almoſt his only food, many of their ſeeds are committed to the earth, or mixed in the moraſs with moſs, where he had retired. The glandularia, when ſhe hides up her nuts, often forgets them, and they ſtrike root. The ſame is obſervable of the walnut; mice collect and bury great quantities of them, and being afterwards killed by different animals, the nuts germinate.

6. We are aſtoniſhed to find moſſes, fungi, byſſus, and mucor, growing everywhere; but it is for want of reflecting that their ſeeds are ſo minute that they are almoſt inviſible to the naked eye. They float in the air like atoms, and are dropped everywhere, but grow only in thoſe places where there was no vegetation before; and hence we find the ſame moſſes in North America and in Europe.

7. Seeds are alſo diſperſed by the ocean, and by rivers. "In Lapland (ſays Linnæus), we ſee the moſt evident proofs how far rivers contribute to depoſite the ſeeds of plants. I have ſeen Alpine plants growing upon their ſhores frequently 36 miles diſtant from the Alps; for their ſeeds falling into the rivers, and being carried along and left by the ſtream, take root there.—We may gather likewiſe from many circumſtances how much the ſea furthers this buſineſs.—In Roſlagia, the iſland of Græſœa, Oeland, Gothland, and the ſhores of Scania, there are many foreign and German plants not yet naturalized in Sweden. The centaury is a German plant, whoſe ſeeds being carried by the wind into the ſea, the waves landed this foreigner upon the coaſts of Sweden. I was aſtoniſhed to ſee the veronica maritima, a German plant, growing at Tornea, which hitherto had been found only in Græſœa: the ſea was the vehicle by which this plant was tranſported thither from Germany; or poſſibly it was brought from Germany to Græſœa, and from thence to Tornea. Many have imagined, but erroneouſly, that ſeed corrupts in water, and loſes its principle of vegetation. Water at the bottom of the ſea is ſeldom warm enough to deſtroy ſeeds; we have ſeen water cover the ſurface of a field for a whole winter, while the ſeed which it contained remained unhurt, unleſs at the beginning of ſpring the waters were let down ſo low by drains, that the warmth of the ſun-beams reached to the bottom. Then the ſeeds germinate, but preſently become putreſcent; ſo that for the reſt of the year the earth remains naked and barren. Rain and ſhowers carry ſeeds into the cracks of the earth, ſtreams, and rivers; which laſt, conveying them to a diſtance from their native places, plant them in a foreign ſoil."

Amoen. Acad.

8. Laſtly, ſome ſeeds aſſiſt their projection to a diſtance in a very ſurpriſing manner. The crupina, a ſpecies of centaury, has its ſeeds covered over with erect briſtles, by whoſe aſſiſtance it creeps and moves about in ſuch a manner, that it is by no means to be kept in the hand. If you confine one of them between the ſtocking and the foot, it creeps out either at the ſleeve or neck-band, travelling over the whole body. If the bearded oat, after harveſt, be left with other grain in the barn, it extricates itſelf from the glume; nor does it ſtop in its progreſs till it gets to the walls of the building. Hence, ſays Linnæus, the Dalecarlian, after he has cut and carried it into the barn, in a few days finds all the glumes empty, and the oats ſeparate from them; for every oat has a ſpiral ariſta or beard annexed to it, which is contracted in wet, and extended in dry weather. When the ſpiral is contracted, it drags the oat along with it: the ariſta being bearded with minute hairs pointing downward, the grain neceſſarily follows it; but when it expands again, the oat does not go back to its former place, the roughneſs of the beard the contrary way preventing its return. If you take the ſeeds of equiſetum, or fern, theſe being laid upon paper, and viewed in a microſcope, will be ſeen to leap over any obſtacle as if they had feet; by which they are ſeparated and diſperſed one from another; ſo that a perſon ignorant of

this property would pronounce theſe ſeeds to be ſo many mites or ſmall inſects.

We cannot ſiniſh this article without remarking, that many ingenious men believe that plants have a power of perception. Of this opinion we ſhall now give an account from the ſecond volume of the Mancheſter Tranſactions, where we find ſome *ſpeculations on the perceptive power of vegetables by Dr Percival*, who attempts to ſhow, by the ſeveral analogies of organization, life, inſtinct, ſpontaneity, and ſelf-motion, that plants, like animals, are endued with the powers both of perception and enjoyment. The attempt is ingenious, and is ingeniouſly ſupported, but in our opinion fails to convince. That there is an analogy between animals and vegetables is certain; but we cannot from thence conclude that they either perceive or enjoy. Botaniſts have, it is true, derived from *anatomy* and *phyſiology*, almoſt all the terms employed in the deſcription of plants. But we cannot from thence conclude, that their organization, though it bears an analogy to that of animals, is the ſign of *a living principle*, if to this *principle* we annex the idea of *perception;* yet ſo fully is our author convinced of the truth of it, that he does not think it extravagant to ſuppoſe, that, in ſome future period, perceptivity may be diſcovered to extend even beyond the limits now aſſigned to vegetable life. Corallines, madrepores, millepores, and ſponges, were formerly conſidered as foſſil bodies: but the experiments of Count Marſigli evinced, that they are endued with life, and led him to claſs them with the maritime plants. And the obſervations of Ellis, Juſſieu, and Peyſonel, have ſince raiſed them to the rank of animals. The detection of error, in long eſtabliſhed opinions concerning one branch of natural knowledge, juſtifies the ſuſpicion of its exiſtence in others, which are nearly allied to it. And it will appear from the proſecution of our inquiry into the inſtincts, ſpontaneity, and ſelf-moving power of vegetables, that the ſuſpicion is not without foundation.

He then goes on to draw a compariſon between the inſtincts of animals and thoſe of vegetables; the calf, as ſoon as it comes into the world, applies to the teats of the cow; and the duckling, though hatched under a hen, runs to the water.

"Inſtincts analogous to theſe (ſays our author), operate with equal energy on the vegetable tribe. A ſeed contains a germ, or plant in miniature, and a radicle, or little root, intended by nature to ſupply it with nouriſhment. If the ſeed be ſown in an inverted poſition, ſtill each part purſues its proper direction. The plumula turns upward, and the radicle ſtrikes downward into the ground. A hop-plant, turning round a pole, follows the courſe of the ſun, from ſouth to weſt, and ſoon dies, when forced into an oppoſite line of motion: but remove the obſtacle, and the plant will quickly return to its ordinary poſition. The branches of a honeyſuckle ſhoot out longitudinally, till they become unable to bear their own weight; and then ſtrengthen themſelves, by changing their form into a ſpiral: when they meet with other living branches, of the ſame kind, they coaleſce, for mutual ſupport, and one ſpiral turns to the right and the other to the left; thus ſeeking, by an inſtinctive impulſe, ſome body on which to climb, and increaſing the probability of finding one by the diverſity of their courſe: for if the auxiliary branch be dead, the other uniformly winds itſelf round from the right to the left.

"Theſe examples of the inſtinctive economy of vegetables have been purpoſely taken from ſubjects familiar to our daily obſervation. But the plants of warmer climates, were we ſufficiently acquainted with them, would probably furniſh better illuſtrations of this acknowledged power of animality: and I ſhall briefly recite the hiſtory of a very curious exotic, which has been delivered to us from good authority; and confirmed by the obſervations of ſeveral European botaniſts."

The doctor then goes on to give a deſcription of the *dionæa muſcipula* (B), for which ſee vol. vi. p. 32.; and concludes, that if he has furniſhed any preſumptive proof of the inſtinctive power of vegetables, it will neceſſarily follow that they are endued with ſome degree of ſpontaneity. More fully to evince this, however, the doctor points out a few of thoſe phenomena in the vegetable kingdom which ſeem to indicate ſpontaneity.—"Several years ago (ſays he), whilſt engaged in a courſe of experiments to aſcertain the influence of fixed air on vegetation, the following fact repeatedly occurred to me. A ſprig of mint, ſuſpended by the root, with the head downwards,

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(B) Dr Watſon, the biſhop of Landaff, who has eſpouſed the ſame ſide of the queſtion with Dr Percival (ſee the 5th vol. of his Chemical Eſſays), reaſons thus on the motions of vegetables. "Whatever can produce any effect (ſays he) upon an animal organ, as the impact of external bodies, heat and cold, the vapour of burning ſulphur, of volatile alkali, want of air, &c. are found to act alſo upon the plants called *ſenſitive*. But not to inſiſt upon any more inſtances, the muſcular motions of the dionæa muſcipula, lately brought into Europe from America, ſeem far ſuperior in quickneſs to thoſe of a variety of animals. Now to refer the muſcular motions of ſhell-fiſh and zoophytes to an internal principle of volition, to make them indicative of the perceptivity of the being, and to attribute the more notable ones of vegetables to certain mechanical dilatations and contractions of parts occaſioned by external impulſe, is to err againſt that rule of philoſophizing which aſſigns the ſame cauſes for effects of the ſame kind. The motions in both caſes are equally accommodated to the preſervation of the being to which they belong, are equally diſtinct and uniform, and ſhould be equally derived from mechaniſm, or equally admitted as criterions of perception.

"I am ſenſible that theſe and other ſimilar motions of vegetables may by ſome be conſidered as analogous to the automatic or involuntary motions of animals; but as it is not yet determined amongſt the phyſiologiſts, whether the motion of the heart, the periſtaltic motion of the bowels, the contractions obſervable upon external impulſe in the muſcles of animals deprived of their heads and hearts, be attributable to an irritability unaccompanied with perceptivity, or to an uneaſy ſenſation, there ſeems to be no reaſon for entering into ſo obſcure a diſquiſition; eſpecially ſince irritability, if admitted as the cauſe of the motions of vegetables, muſt *à fortiori* be admitted as the cauſe of the leſs exquiſite and diſcernible motions of being univerſally referred to the animal kingdom."

downwards, in the middle glaſs veſſel of Dr Nooth's machine, continued to thrive vigorouſly, without any other pabulum than what was ſupplied by the ſtream of mephitic gas to which it was expoſed. In 24 hours the ſtem formed into a curve, the head became erect, and gradually aſcended towards the mouth of the veſſel; thus producing, by ſucceſſive efforts, a new and unuſual configuration of its parts. Such exertions in the ſprig of mint, to rectify its inverted poſition, and to remove from a foreign to its natural element, ſeems to evince volition to avoid what was evil, and to recover what had been experienced to be good. If a plant, in a garden-pot, be placed in a room which has no light except from a hole in the wall, it will ſhoot towards the hole, paſs through it into the open air, and then vegetate upwards in its proper direction. Lord Kames relates, that, 'amongſt the ruins of New Abbey, formerly a monaſtery in Galloway, there grows on the top of a wall a plane tree, 20 feet high. Straitened for nouriſhment in that barren ſituation, it ſeveral years ago directed roots down the ſide of the wall till they reached the ground ten feet below: and now the nouriſhment it afforded to theſe roots, during the time of deſcending, is amply repaid; having every year ſince that time made vigorous ſhoots. From the top of the wall to the ſurface of the earth, theſe roots have not thrown out a ſingle fibre, but are now united into a pretty thick hard root.'

"The regular movements by which the ſun-flower preſents its ſplendid diſk to the ſun have been known to naturaliſts, and celebrated by poets, both of ancient and modern times. Ovid founds upon it a beautiful ſtory; and Thomſon deſcribes it as an attachment of love to the celeſtial luminary.

> 'But one, the lofty follower of the ſun,
> 'Sad when he ſets, ſhuts up her yellow leaves,
> 'Drooping all night; and when he warm returns,
> 'Points her enamour'd boſom to his ray.'
>
> SUMMER, line 216.

Dr Percival next touches on motion; he mentions corallines, ſea-pens*, oyſters, &c. as endued with the power of motion in a very ſmall degree, and then he ſpeaks in the following manner. "Mr Miller (ſays he), in his late account of the iſland of Sumatra, mentions a ſpecies of coral, which the inhabitants have miſtaken for a plant, and have denominated it *lalan laut*, or ſea-graſs. It is found in ſhallow bays, where it appears like a ſtraight ſtick, but when touched withdraws itſelf into the ſand. Now if ſelf-moving faculties like theſe indicate animality, can ſuch a diſtinction be denied to vegetables, poſſeſſed of them in an equal or ſuperior degree? The water-lily, be the pond deep or ſhallow in which it grows, puſhes up its flower-ſtems till they reach the open air, that the farina fecundans may perform without injury its proper office. About ſeven in the morning the ſtalk erects itſelf, and the flowers riſe above the ſurface of the water: in this ſtate they continue till four in the afternoon, when the ſtalk becomes relaxed, and the flowers ſink and cloſe. The motions of the ſenſitive plant have been long noticed with admiration, as exhibiting the moſt obvious ſigns of perceptivity. And if we admit ſuch motions as criteria of a like power in other beings, to attribute them in this inſtance to mere mechaniſm, actuated ſolely by external impulſe, is to deviate from the ſoundeſt rule of philoſophizing, which directs us not to multiply cauſes when the effects appear to be the ſame. Neither will the laws of electricity better ſolve the phenomena of this animated vegetable: for its leaves are equally affected by the contact of electric and non-electric bodies; ſhow no change in their ſenſibility whether the atmoſphere be dry or moiſt; and inſtantly cloſe when the vapour of volatile alkali or the fumes of burning ſulphur are applied to them. The powers of chemical ſtimuli to produce contractions in the fibres of this plant may perhaps lead ſome philoſophers to refer them to the *vis inſita*, or irritability, which they aſſign to certain parts of organized matter, totally diſtinct from, and independent of, any ſentient energy. But the hypotheſis is evidently a ſolecíſm, and refutes itſelf. For the preſence of irritability can only be proved by the experience of irritations, and the idea of irritation involves in it that of feeling.

"But there is a ſpecies of the order of decandria, which conſtantly and uniformly exerts a ſelf-moving power, uninfluenced either by chemical ſtimuli, or by any external impulſe whatſoever. This curious ſhrub, which was unknown to Linnæus, is a native of the Eaſt Indies, but has been cultivated in ſeveral botanical gardens here. I had an opportunity of examining it in the collection of the late Dr Brown. See HEDYSARUM.—I cannot better comment on this wonderful degree of vegetable animation than in the words of Cicero. *Inanimum eſt omne quod pulſu agitatur externo; quod autem eſt animal, id motu cietur interiore et ſuo.*

"I have thus attempted, with the brevity preſcribed by the laws of this ſociety, to extend our views of animated nature; to gratify the mind with the contemplation of multiplied acceſſions to the general aggregate of felicity; and to exalt our conceptions of the wiſdom, power, and beneficence of God. In an undertaking never yet accompliſhed, diſappointment can be no diſgrace: in one directed to ſuch noble objects, the motives are a juſtification, independently of ſucceſs. Truth, indeed, obliges me to acknowledge, that I review my ſpeculations with much diffidence; and that I dare not preſume to expect they will produce any permanent conviction in others, becauſe I experience an inſtability of opinion in myſelf. For, to uſe the language of Tully, *Neſcio quomodo, dum lego, aſſentior; cum poſui librum, aſſenſio omnis illa elabitur.*—But this ſcepticiſm is perhaps to be aſcribed to the influence of habitual preconceptions, rather than to a deficiency of reaſonable proof. For beſides the various arguments which have been advanced in favour of vegetable perceptivity, it may be further urged, that the hypotheſis recommends itſelf by its conſonance to thoſe higher analogies of nature, which lead us to conclude, that the greateſt poſſible ſum of happineſs exiſts in the univerſe. The bottom of the ocean is overſpread with plants of the moſt luxuriant magnitude. Immenſe regions of the earth are covered with perennial foreſts. Nor are the Alps, or the Andes, deſtitute of herbage, though buried in deeps of ſnow. And can it be imagined that ſuch profuſion of life ſubſiſts without the leaſt ſenſation or enjoyment? Let us rather, with humble reverence, ſuppoſe, that vegetables participate, in ſome low degree, of the common allotment of vitality; and that our great Creator hath

* See Pe-[illegible] &c.

apportioned good to all living things, ‘ in number, weight, and meaſure.” See *SENSITIVE Plant*, MIMOSA. *DIONÆA Muſcipula*, *Vegetable MOTION*, *&c.*

To theſe ingenious and ſpirited obſervations, we ſhall ſubjoin nothing of our own, but leave our readers to determine for themſelves (c). Speculations of this kind, when carried on by ſober men, will never be productive of bad conſequences; but by the ſubtle ſceptic, or the more unwary inquirer, they may be made the engine of very dangerous errors. By this we do not mean to inſinuate that the ſpirit of inquiry ſhould be ſuppreſſed, becauſe that ſpirit, in the hands of weak or of wicked men, may be abuſed. By thoſe, however, who know the bad conſequences that may be drawn, and indeed that have been drawn, from the opinions we have now given an account of, our caution will not be deemed impertinent.

PLANTS growing on Animals. See *INSECTS giving root to Plants.*

Sexes of PLANTS. See SEXES and BOTANY.

Colours of PLANTS. See *COLOUR of Plants.*

Colours extracted from PLANTS. See *COLOUR-making.*

Method of Drying and Preſerving PLANTS for Botaniſts.—Many methods have been deviſed for the preſervation of plants: we ſhall relate only thoſe that have been found moſt ſucceſsful.

Withering's Botanical Arrangement, Introd. p. 48.

Firſt prepare a preſs, which a workman will make by the following directions. Take two planks of wood not liable to warp. The planks muſt be two inches thick, 18 inches long, and 12 inches broad. Get four male and four female ſcrews, ſuch as are commonly uſed for ſecuring ſaſh windows. Let the four female ſcrews be let into the four corners of one of the planks, and correſponding holes made through the four corners of the other plank for the male ſcrews to paſs through, ſo as to allow the two planks to be ſcrewed tightly together. It will not be amiſs to face the bearing of the male ſcrews upon the wood with iron plates; and if the iron plates went acroſs from corner to corner of the wood, it would be a good ſecurity againſt the warping.

Secondly, get half a dozen quires of large ſoft ſpongy paper (ſuch as the ſtationers call *bloſſom blotting paper* is the beſt), and a few ſheets of ſtrong paſteboard.

The plants you wiſh to preſerve ſhould be gathered in a dry day, after the ſun hath exhaled the dew; taking particular care to collect them in that ſtate wherein their generic and ſpecific characters are moſt conſpicuous. Carry them home in a tin box nine inches long, four inches and a half wide, and one inch and a half deep. Get the box made of the thinneſt tinned iron that can be procured; and let the lid open upon hinges. If any thing happen to prevent the immediate uſe of the ſpecimens you have collected, they will be kept freſh two or three days in this box much better than by putting them in water. When you are going to preſerve them, ſuffer them to lie upon a table until they become limber; and then they ſhould be laid upon a paſteboard, as much as poſſible in their natural form, but at the ſame time with a particular view to their generic and ſpecific characters. For this purpoſe it will be adviſeable to ſeparate one of the flowers, and to diſplay the generic character. If the ſpecific character depend upon the flower or upon the root, a particular diſplay of that will be likewiſe neceſſary. When the plant is thus diſpoſed upon the paſteboard, cover it with eight or ten layers of ſpongy paper, and put it into the preſs. Exert only a ſmall degree of preſſure for the firſt two or three days; then examine it, unfold any unnatural plaits, rectify any miſtakes, and, after putting freſh paper over it, ſcrew the preſs harder. In about three days more ſeparate the plant from the paſteboard, if it is ſufficiently firm to allow of a change of place; put it upon a freſh paſteboard, and, covering it with freſh bloſſom paper, let it remain in the preſs a few days longer. The preſs ſhould ſtand in the ſunſhine, or within the influence of a fire.

When it is perfectly dry, the uſual method is to faſten it down, with paſte or gum water, on the right-hand inner page of a ſheet of large ſtrong writing-paper. It requires ſome dexterity to glue the plant neatly down, ſo that none of the gum or paſte may appear to defile the paper. Preſs it gently again for a day or two, with a half ſheet of bloſſom-paper betwixt the folds of the writing paper. When it is quite dry, write upon the left-hand inner page of the paper the name of the plant; the ſpecific character; the place where, and the time when, it was found; and any other remarks you may think proper. Upon the back of the ſame page, near the fold of the paper, write the name of the plant, and then place it in your cabinet. A ſmall quantity of finely powdered arſenic, or corroſive ſublimate, is uſually mixed with the paſte or gum-water, to prevent the devaſtations of inſects; but the ſeeds of ſtaves-acre finely powdered will anſwer the ſame purpoſe, without being liable to corrode or to change the colour of the more delicate plants. Some people put the dried plants into the ſheets of writing paper, without faſtening them down at all; and others only faſten them by means of ſmall ſlips of paper, paſted acroſs the ſtem or branches. Where the ſpecies of any genus are numerous, and the ſpecimens are ſmall, ſeveral of them may be put into one ſheet of paper.

Another more expeditious method is to take the plants out of the preſs after the firſt or ſecond day; let them remain upon the paſteboard; cover them with five or ſix leaves of bloſſom paper, and iron them with a hot ſmoothing iron until they are perfectly dry. If the iron be too hot, it will change the colours; but ſome people, taught by long practice, will ſucceed very happily. This is quite the beſt method to treat the orchis and other ſlimy mucilaginous plants.

(c) In the 2d volume of *Tranſactions of the Linnæan Society*, we find Dr Percival's reaſoning very ably combated, as far as he draws his conſequences from the external motions of plants; where it is argued, that theſe motions, though in ſome reſpects ſimilar to thoſe of animals, can and ought to be explained, without concluding that they are endowed either with perception or volition. Mr Townſon concludes his paper in theſe words: “ When all is conſidered (ſays he), I think we ſhall place this opinion among the many ingenious flights of the imagination, and ſoberly follow that blind impulſe which leads us naturally to give ſenſation and perceptivity to animal life, and to deny it to vegetables; and ſo ſtill ſay with Ariſtotle, and our great maſter Linnæus, *Vegetabilia creſcunt & vivunt; animalia creſcunt, vivunt, & ſentiunt.*”

Another method is to take the plants when freſh gathered, and, inſtead of putting them into the preſs, immediately to faſten them down to the paper with ſtrong gum water: then dip a camel-hair pencil into ſpirit-varniſh, and varniſh the whole ſurface of the plant two or three times over. This method ſucceeds very well with plants that are readily laid flat, and it preſerves their colours better than any other. The ſpirit varniſh is made thus. To a quart of highly rectified ſpirit of wine put five ounces of gum ſandarach; two ounces of maſtich in drops; one ounce of pale gum elemi, and one ounce of oil of ſpike-lavender. Let it ſtand in a warm place, and ſhake it frequently to expedite the ſolution of the gums.

Where no better convenience can be had, the ſpecimens may be diſpoſed ſyſtematically in a large folio book; but a vegetable cabinet is upon all accounts more eligible. With the aſſiſtance of the following deſcription a workman may readily make one. The drawers muſt have backs and ſides, but no other front than a ſmall ledge. Each drawer will be 14 inches wide, and 10 inches from the back to the front, after allowing half an inch for the thickneſs of the two ſides, and a quarter of an inch for the thickneſs of the back. The ſides of the drawers, in the part next the front, muſt be ſloped off in a ſerpentine line, ſomething like what the workmen call an *ogee*. The bottoms of the drawers muſt be made to ſlide in grooves cut in the uprights, ſo that no ſpace may be loſt betwixt drawer and drawer. After allowing a quarter of an inch for the thickneſs of the bottom of each drawer, the clear perpendicular ſpace in each muſt be as in the following table.

I.	Two tenths of an inch.
II.	One inch and two-tenths.
III.	Four inch. and ſix-tenths.
IV.	Two inches and three-tenths.
V.	Seven inches and eight-tenths.
VI.	Two inches and two-tenths.
VII.	Two tenths of an inch.
VIII.	One inch and four-tenths.
IX.	Two-tenths of an inch.
X.	Two inches and eight-tenths.
XI.	One inch and two-tenths,
XII.	Three inches and five-tenths.
XIII.	Two inches and four-tenths.
XIV.	Three inches and eight-tenths.
XV.	Three inches and four-tenths.
XVI.	One inch and three-tenths.
XVII.	Two inches and eight-tenths.
XVIII.	Six-tenths of an inch.
XIX.	Ten inches.
XX.	One inch and nine-tenths.
XXI.	Four inches and four-tenths.
XXII	Two inches and ſix-tenths.
XXIII.	One inch and two-tenths.
XXIV.	Seventeen inches.

This cabinet ſhuts up with two doors in front; and the whole may ſtand upon a baſe, containing a few drawers for the reception of duplicates and papers.

Foſſil PLANTS. Many ſpecies of tender and herbaceous plants are found at this day, in great aboundance, buried at conſiderable depths in the earth, and converted, as it were, into the nature of the matter they lie among; foſſil wood is often found very little altered, and often impregnated with ſubſtances of almoſt all the different foſſil kinds, and lodged in all the ſeveral ſtrata, ſometimes firmly imbedded in hard matter; ſometimes looſe: but this is by no means the caſe with the tenderer and more delicate ſubjects of the vegetable world. Theſe are uſually immerſed either in a blackiſh ſlaty ſubſtance, found lying over the ſtrata of coal, elſe in looſe nodules of ferruginous matter of a pebble-like form, and they are always altered into the nature of the ſubſtance they lie among: what we meet with of theſe are principally of the fern kind; and what is very ſingular, though a very certain truth, is, that theſe are principally the ferns of American growth, not thoſe of our own climate. The moſt frequent foſſil plants are the polypody, ſpleenwort, oſmund, trichomanes, and the ſeveral larger and ſmaller ferns; but beſides theſe there are alſo found pieces of the equiſetum or horſe-tail, and joints of the ſtellated plants, as the clivers, madder, and the like; and theſe have been too often miſtaken for flowers; ſometimes there are alſo found complete graſſes, or parts of them, as alſo reeds, and other watery plants; ſometimes the ears of corn, and not unfrequently the twigs or bark, and impreſſions of the bark and fruit of the pine or fir kind, which have been, from their ſcaly appearance, miſtaken for the ſkins of fiſhes; and ſometimes, but that very rarely, we meet with moſſes and ſea-plants.

Many of the ferns not unfrequently found, are of very ſingular kinds, and ſome ſpecies yet unknown to us; and the leaves of ſome appear ſet at regular diſtances, with round protuberances and cavities. The ſtones which contain theſe plants ſplit readily, and are often found to contain, on one ſide, the impreſſion of the plant, and on the other the prominent plant itſelf; and, beſide all that have been mentioned, there have been frequently ſuppoſed to have been found with us ears of common wheat, and of the maize or Indian corn; the firſt being in reality no other than the common endmoſt branches of the firs, and the other the thicker boughs of various ſpecies of that and of the pine kind, with their leaves fallen off; ſuch branches in ſuch a ſtate cannot but afford many irregular tubercles and papillæ, and, in ſome ſpecies, ſuch as are more regularly diſpoſed.

Theſe are the kinds moſt obvious in England; and theſe are either immerſed in the ſlaty ſtone which conſtitutes whole ſtrata, or in flatted nodules uſually of about three inches broad, which readily ſplit into two pieces on being ſtruck.

They are moſt common in Kent, in coal-pits near Newcaſtle, and the foreſt of Dean in Glouceſterſhire; but are more or leſs found about almoſt all our coal-pits, and many of our iron mines. Though theſe ſeem the only ſpecies of plants found with us, yet in Germany there are many others, and thoſe found in different ſubſtances. A whitiſh ſtone, a little harder than chalk, frequently contains them: they are found alſo often in a gray ſlaty ſtone of a firmer texture, not unfrequently in a blackiſh one, and at times in many others. Nor are the bodies themſelves leſs various here than the matter in which they are contained: the leaves of trees are found in great abundance, among which thoſe of the willow, poplar, white thorn, and pear trees, are the moſt common; ſmall branches of box, leaves of the olive tree, and ſtalks of garden thyme, are alſo found there; and ſometimes ears of the various ſpecies of corn, and the larger as well as the ſmaller moſſes in great abundance.

Theſe ſeem the tender vegetables, or herbaceous plants, certainly found thus immerſed in hard ſtone, and buried at great depths in the earth: of theſe of many kinds there are alſo named by authors; but as in ſtudies ſo imperfect errors are eaſily fallen into, theſe ſeem all that can be aſcertained beyond mere conjecture.

PLANTS, method of preſerving them in their original ſhape and colour. Waſh a ſufficient quantity of fine ſand, ſo as perfectly to ſeparate it from all other ſubſtances; dry it; paſs it through a ſieve to clear it from any groſs particles which would not riſe in the waſhing: take an earthen veſſel of a proper ſize and form, for every plant and flower which you intend to preſerve; gather your plants and flowers when they are in a ſtate of perfection, and in dry weather, and always with a convenient portion of the ſtalk: heat a little of the dry ſand prepared as above, and lay it in the bottom of the veſſel, ſo as equally to cover it; lay the plant or flower upon it ſo as that no part of it may touch the ſides of the veſſel: ſift or ſhake in more of the ſame ſand by little and little upon it, ſo that the leaves may be extended by degrees, and without injury, till the plant or flower is covered about two inches thick: put the veſſel into a ſtove, or hot-houſe, heated by little and little to the 50th degree; let it ſtand there a day or two, or perhaps more, according to the thickneſs and ſucculence of the flower or plant; then gently ſhake the ſand out upon a ſheet of paper, and take out the plant, which you will find in all its beauty, the ſhape as elegant, and the colour as vivid as when it grew.

Some flowers require certain little operations to preſerve the adherence of their petals, particularly the tulip; with reſpect to which it is neceſſary, before it is buried in the ſand, to cut the triangular fruit which riſes in the middle of the flower; for the petals will then remain more firmly attached to the ſtalk.

A hortus ſiccus prepared in this manner would be one of the moſt beautiful and uſeful curioſities that can be.

Moving PLANT. See HEDYSARUM, BOTANY *Index.*

Sea PLANTS. See *SEA Plants.*

Senſitive PLANT. See MIMOSA, BOTANY *Index.*

PLANT-Lice, Vine-fretters, or *Pucerons.* See APHIS, ENTOMOLOGY *Index.*

PLANTA, a PLANT. See PLANT.

PLANTA Fœminea, a female plant, is one which bears female flowers only. It is oppoſed to a *male* plant, which bears only male flowers; and to an *androgynous* one, which bears flowers of both ſexes. Female plants are produced from the ſame ſeed with the male, and arrange themſelves under the claſs of diœcia in the ſexual method.

PLANTAGENET, the ſurname of the kings of England from Henry II. to Richard III. incluſive. Antiquarians are much at a loſs to account for the origin of this name; and the beſt derivation they can find for it is, that Fulk, the firſt earl of Anjou of that name, being ſtung with remorſe for ſome wicked action, went in pilgrimage to Jeruſalem as a work of atonement; where, being ſoundly ſcourged with broom twigs, which grew plentifully on the ſpot, he ever after took the ſurname of *Plantagenet* or *broomſtalk,* which was retained by his noble poſterity.

PLANTAGO, PLANTAIN; a genus of plants belonging to the tetrandria claſs. See BOTANY *Index.*—Of the plantain there are the following ſpecies: The common broad-leaved plantain, called *waybred,* or *waybread*; becauſe it commonly grows by the wayſide; the great hoary plantain, or lambs-tongue; the narrow-leaved plantain, or ribwort.

PLANTAIN. See PLANTAGO, BOTANY *Index.*

PLANTAIN-Tree. See MUSA, BOTANY *Index.*

PLANTATION, in the Weſt Indies, denotes a ſpot of ground which a planter, or perſon arrived in a new colony, pitches on to cultivate for his own uſe, or is aſſigned for that purpoſe. However, the term *plantation* is often uſed in a term ſynonymous with colony. See COLONY.

PLANTERSHIP, in a general ſenſe, the buſineſs of a planter.

PLANTERSHIP, in the Weſt Indies, denotes the management of a ſugar plantation, including not only the cultivation of the cane, but the various proceſſes for the extraction of the ſugar, together with the making of ſugar ſpirits. See RUM, SACCHARUM, and SUGAR.

To effect a deſign ſo comprehenſive, it is neceſſary for a planter to underſtand every branch of the art preciſely, and to uſe the utmoſt attention and caution both in the laying down and executing of his plans. It is therefore the duty of a good planter to inſpect every part of his plantation with his own eyes; to place his proviſions, ſtores, and utenſils, in regular order, and in ſafe repoſitories; that by preſerving them in perfection, all kinds of waſte may be prevented.

But as negroes, cattle, mules, and horſes, are as it were the nerves of a ſugar-plantation, it is expedient to treat that ſubject with ſome accuracy.

Of Negroes, Cattle, &c.] In the firſt place, then, as it is the intereſt of every planter to preſerve his negroes in health and ſtrength; ſo every act of cruelty is not leſs repugnant to the maſter's real profit, than it is contrary to the laws of humanity: and if a manager conſiders his own caſe and his employer's intereſt, he will treat all negroes under his care with due benevolence; for good diſcipline is by no means inconſiſtent with humanity: on the contrary, it is evident from experience, that he who feeds his negroes well, proportions their labour to their age, ſex, and ſtrength, and treats them with kindneſs and good nature, will reap a much larger product, and with infinitely more eaſe and ſelf-ſatisfaction, than the moſt cruel taſkmaſter, who ſtarves his negroes, or chaſtiſes them with undue ſeverity. Every planter then who wiſhes to grow rich with eaſe, muſt be a good economiſt; muſt feed his negroes with the moſt wholeſome food, ſufficient to preſerve them in health and vigour. Common experience points out the methods by which a planter may preſerve his people in health and ſtrength. Some of his moſt fruitful land ſhould be allotted to each negro in proportion to his family, and a ſufficient portion of time allowed for the cultivation of it; but becauſe ſuch allotment cannot in long droughts produce enough for his comfortable ſupport, it is the incumbent duty of a good planter to have always his ſtores well filled with Guinea corn, yams, or eddoes, beſides potatoes growing in regular ſucceſſion: for plenty begets cheerfulneſs of heart, as well as ſtrength of body; by which more work is effected in a day by the ſame hands than in a week when enervated by want and ſeverity. Scanty meals may ſuſtain life; but it is evident, that more is requiſite to enable a negro or any other perſon to go through the neceſſary labours. He, therefore, who will reap plentifully, muſt plant great abundance of proviſions as well

Martin on Plantership.

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as ſugar-canes; and it is nature's economy ſo to fructify the ſoil by the growth of yams, plantanes, and potatoes, as to yield better harveſts of ſugar, by that very means, than can be produced by many other arts of cultivation. Plantains are the principal ſupport of all the negroes in Jamaica; and are alſo much cultivated, at great expence of manure, in Barbadoes; but ought not to be ſolely depended upon in climates ſubject to hurricanes. A celebrated planter and economiſt of the laſt mentioned iſland, who raiſed an immenſe fortune from very ſmall beginnings only by planting, affirmed, that he fed conſtantly at leaſt 300 negroes out of 12 acres of plantains. How this excellent produce came to be ſo long neglected in ſome of the iſlands it is hard to gueſs; but at preſent the neglect ſeems to be founded upon a vulgar error, that plantains cannot thrive in any other than a rich moiſt ſoil. In ſuch places, no doubt, they do thrive moſt luxuriantly; but yet they thrive and bear fruit abundantly on mountains and in rocky places, and in the dryeſt black mould upon marle or rocks, and even in ſharp gravelly ſoils, as may be evinced by numberleſs inſtances.

However plenty of wholeſome food may be conducive to health, there are two other means, equally neceſſary to the ſtrength and longevity of negroes, well worth the planter's attention: and thoſe are, to chooſe airy dry ſituations for their houſes; and to obſerve frequently that they be kept clean, in good repair, and perfectly water-tight; for naſtineſs, and the inclemencies of weather, generate the moſt malignant diſeaſes. If theſe houſes are ſituated alſo in regular order, and at due diſtances, the ſpaces may at once prevent general devaſtations by fire, and furniſh plenty of fruits and pot-herbs, to pleaſe an unvitiated palate, and to purify the blood. Thus then ought every planter to treat his negroes with tenderneſs and generoſity, that they may be induced to love and obey him out of mere gratitude, and become real good beings by the imitation of his behaviour; and therefore a good planter, for his own eaſe and happineſs, will be careful of ſetting a good example.

Having thus hinted the duties of a planter to his negroes, let the next care be of cattle, mules, and horſes. The planters of Barbadoes (who are perhaps the moſt ſkilful of all others, and exact to a nicety in calculations of profit and loſs), are, with reſpect to their cattle, the moſt remiſs of any in all the iſlands; as if the carriage of canes to the mill, and of plantation-produce to the market, was not as eſſential as any other branch of plantерſhip. At Barbadoes, in particular, the care of theſe animals is of more importance: becauſe the ſoil, worn out by long culture, cannot yield any produce without plenty of dung. Some planters are nevertheleſs ſo ingeniouſly thrifty, as to carry their canes upon negroes heads; acting in that reſpect diametrically oppoſite to their own apparent intereſt, which cannot be ſerved more effectually than by ſaving the labour of human hands, in all caſes where the labour of brutes can be ſubſtituted; and for that end, no means of preſerving thoſe creatures in health and ſtrength ought to be neglected.

The firſt care therefore is to provide plenty and variety of food. In crop-time, profuſion of cane-tops may be had for the labour of carriage; but they will be more wholeſome and nutritious if tedded like hay by the ſun's heat, and ſweated by laying them in heaps a few days before they are eaten. In this ſeaſon of abundance, great ricks of cane-tops (the butt ends turned inwards) ſhould be made in the moſt convenient corner of each field, to ſupply the want of paſturage and other food: and theſe are very wholeſome if chopped into ſmall pieces, and mixed ſometimes with common ſalt or ſprinkled with melaſſes mixed with water: but yet the cattle require change of food to preſerve them in ſtrength; ſuch as Guinea-corn, and a variety of graſs, which every ſoil produces with a little care in moiſt weather; and indeed this variety is found neceſſary in all climes.

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But ſince that variety is not to be had during thoſe ſevere droughts to which hot climates are liable, and much more in theſe ſmall iſlands which cannot ſpare large tracts of meadow-lands for hay, the only reſource is the fodder of cane-tops or tedded Guinea-corn leaves; which are very nutritious, and may be preſerved in perfection for more than a whole year, provided the tops or Guinea-corn are well tedded for three or four hot days as they lie ſpread in the field; and then, being tied into bundles or ſheaves, muſt lie in the hot ſun for three or four days more, when they may be fit to be put up into ricks. The beſt method of making them is in an oblong figure, about 30 feet in length, and 16 or 18 feet wide; ſeven feet high at the ſides, and from thence ſloping like the roof of an houſe, the ridge of which muſt be thatched very carefully; for the ſides may be ſecured from wet by placing the bundles with the butts upwards towards the ridge, in courſes, and lapping the upper over the lower courſe.

The beſt method of forming thoſe ricks is to place the firſt courſe of bundles all over the baſe one way; the ſecond courſe reverſely; and ſo alternately till the rick be finiſhed.

When cattle are to be fed with this fodder, it muſt be obſerved to take down the bundles from the top, at the weſt end of the rick, to the bottom; for all theſe ricks muſt ſtand eaſt and weſt lengthwiſe, as well to ſecure them from being overturned by high winds, as for the convenience of preſerving them from wet, which cannot be done when ricks are made round. By this huſbandry, an herd of cattle may be kept in ſtrength, either in ſevere droughts, or in wet ſeaſons when graſs is purgative; and thus the neceſſity or expence of large paſtures may be totally ſaved. The hay-knife uſed in England for cutting hay, anſwers for cutting ricks of tops.

The method of tedding Guinea-corn to make a kind of hay, will require a little explanation here. When Guinea-corn is planted in May, and to be cut down in July, in order to bear ſeed that year, that cutting, tedded properly, will make an excellent hay, which cattle prefer to meadow-hay. In like manner, after Guinea-corn has done bearing ſeed, the after crop will furniſh a great abundance of that kind of fodder which will keep well in ricks for two or three years.

The next care of a planter is to provide ſhade for his cattle; either by trees where they are fed in the heat of the day, if his ſoil requires not dung; or by building a flat ſhed over the pen where cattle are confined for making it. That ſuch ſhades are eſſentially neceſſary to the well-being of all animals in hot weather, is apparent to every common obſerver, who cannot fail of ſeeing each creature forſaking the moſt luxuriant paſtures in the heat of the day for the ſake of ſhade; [illegible]

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vincing the owners, by inſtinctive argument, that ſhade is almoſt as neceſſary to the well-being of the brute creatures as food. Yet, notwithſtanding that demonſtration from the unerring courſe of nature, throughout all our iſlands (except in a very few inſtances), theſe poor creatures are expoſed to the ſcorching ſun-beams without mercy. Such inhuman neglect is not always ſo much the effect of inattention as of a miſtaken notion that ſheds are impedimental to the making of much dung; but a flat ſhed, covered with cane-traſh, may be ſo made as to let rain paſs through it without admiſſion of ſun-beams. This will do for cattle; but mules, which are ſpirited creatures, and work themſelves by draught into a foaming heat, ſhould be put into a warm ſtable, until quite cool: for turning them looſe to paſture when ſo hot, is probably the cauſe of their deſtruction by the glanders.

If the care of providing ſhade for brute creatures is ſo much the duty and intereſt of their owners, how much more is it agreeable to the laws of humanity to provide ſhade for human creatures travelling upon the high-roads in this hot climate? Nothing ſurely of ſo much beauty coſts ſo little expence as planting cocoa-nut or ſpreading timber trees in avenues along the highways, if each proprietor of the lands adjoining hath any taſte of elegance, or feeling for other men: but both thoſe kinds of trees will yield alſo great profit to the proprietor, by furniſhing him with timber, when perhaps not otherwiſe to be had; or with a delicious milk, fitted by nature to cool the effervèſcence of the blood in this hot region; and alſo to improve the ſpirits made from ſugar to the delicacy and ſoftneſs of arrack. Cocoa-nut and cabbage-trees are both very beautiful and ſhady, bearing round heads of great expanſion, upon natural trunks or pillars of elegant proportion, and of ſuch an height as to furniſh a large ſhade, with a free circulation of air equally refreſhing to man and beaſt.

The common objection of injury to canes by the roots of ſuch trees growing on their borders, may be eaſily removed by digging a ſmall trench between the canes and trees, which may intercept their roots, and oblige them to ſeek ſuſtenance in the common road. Let it alſo be conſidered, beſides the benefits above ſuggeſted, that the planter will thus beautify his eſtate to the reſemblance of a moſt ſumptuous garden. And probably that very beauty might not only render the iſlands more healthful to the inhabitants, by preſerving them from fevers kindled by the burning ſun-beams, but alſo much more fruitful by making the weather more ſeaſonable: for as, by cutting down all its woods, an hot country becomes more ſubject to exceſſive droughts; ſo, by replanting it in the manner above deſcribed, this inconvenience would probably be prevented.

Let then the planter be kind not only to his fellow-creatures but merciful to his beaſts; giving them plenty and variety of wholeſome food, clear water, cool ſhade, and a clean bed, bleeding them after a long courſe of hard labour, currying their hides from filth and ticks (A); affording them ſalt and other phyſic when neceſſary; protecting them from the flaying rope-laſhes of a cruel driver (who needs no other inſtrument than a goad); porportioning their labour to their ſtrength; and by every art rendering their work as eaſy as poſſible. The general management of planters is not, perhaps, more defective in any other reſpect than in this: for, by pairing the cattle unequally, and by the drivers ill conduct in writhing to the right and left, the poor creatures are fatigued by much needleſs labour. A horſe ought therefore to be harneſſed before them as a leader. This docile creature, by being led in a ſtraight line, will ſoon learn to be an unerring guide, and the cattle will follow in the ſame direction with united ſtrength, and conſequently with more effect and leſs fatigue to each individual.

The Portugueſe of Madeira, by their poverty and ſcantineſs of paſture, breed the ſmalleſt kind of cattle; and yet one yoke of them will draw a much greater weight than a pair of our largeſt oxen, ſolely by an equal exertion of their joint ſtrength. That equality or evenneſs of draught is preſerved by boring gimblet holes through their horns, within two inches of the points, and running a thong of leather through thoſe holes, ſo as to tie the horns of each pair at ſix inches diſtance from each other. By this ligature the pair of cattle are abſolutely hindered from turning different ways, and draw in an even direction with united force. Thus it appears evidently from reaſon, as well as from experience, that the labour of our beaſts may, by a little contrivance, be rendered more eaſy and effectual.

Of the Culture of various Soils.] In the Britiſh ſugar-colonies there is as great a variety of ſoils as in any country of Europe; ſome naturally very rich or fruitful, yielding a luxuriant product with little labour or culture. This fruitful ſoil is of three kinds: a looſe hazel mould mixed with ſand, like that of St Chriſtopher's, and is the beſt in the known world for producing ſugar in great quantity, and of the beſt quality. The brick mould of Jamaica is ſomewhat of the ſame nature, and next in value; and then the various mixtures of mould and gravel, to be found in veins or plats over all the other iſlands. When any of theſe ſoils are exhauſted of their fertility by long and injudicious culture, they may be reſtored by any kind of dung well rotted; for theſe (B) warm ſoils cannot bear hot unrotten dung, without being laid fallow for a conſiderable time after it. Another improvement is by ſea-ſand or ſea-weed; or by digging in the cane-traſh into ſteep lands, and by letting it lie to rot for ſome months. A third method is, by ploughing and laying it fallow; and the fourth method (the beſt of all), is by folding the fallows by ſheep. But this can be practiſed only where there are extenſive paſtures; nor can the plough be employed where the ſoil abounds with large ſtones. In that caſe, however, the former method of digging in traſh

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(A) One pound of native ſulphur, a quart of lamp-oil, and the like quantity of hog's-lard, intimately mixed and made into an ointment, is a cure for the mange, lice, &c.

(B) Theſe ſoils, which are naturally looſe and upon marle, Mr Martin calls *hot ſoils*; and theſe, he ſays, have been much injured in ſome of the iſlands by dung haſtily made with marle: but if the ſediment of lees were thrown into theſe pens, after being turned over, it would much improve the dung.

traſh will be nearly as effectual, though more expenſive, by hand-labour or hoe-ploughing.

The next beſt ſoil for producing good ſugar is a mould upon clay, which if ſhallow requires much culture and good labour, or its produce will be ſmall in quantity, though of a ſtrong grain and bright colour, ſo as to yield moſt profit to the refiner of any ſugar, except that produced from an hazel or gravelly ſoil, as before mentioned. All the black mould ſoils upon marle are generally fruitful, and will take any kind of dung; but yield not ſo ſtrong or large-grained ſugar. Marle, however, of a white, yellow, or blue colour, or rich mould from waſhes, or aſhes of every kind, are excellent for every ſtrong ſoil, as the chief ingredient in the compoſt of dung: either of them will do alone for ſtiff lands; but the yellow and chocolate marle are the moſt ſoapy, and the richeſt kind of manure (except fine mould) for all ſtiff lands. If theſe are well opened, pulverized by culture, and mixed with hot dung, or any kind of looſe earth or marle, they will produce as plentifully as lighter ſoils: and all kinds of clay-ſoils, except that of a white colour, have theſe two advantages above the fineſt gravel ſoils, that they do not ſcorch ſoon by dry weather, and never grow weary of the ſame manure, as moſt other ſoils do.

The extraordinary hand-labour beſtowed in making dung, may be ſaved by the art of caving, now in general uſe in England. Ten mules or horſes, and two light tumbrels with broad wheels, and ten able negroes, may, by the common uſe of ſpades, ſhovels, and light mattocks or grubbing hoes, make more dung than 60 able negroes can do in the preſent methods.

If marle lies upon riſing grounds, or in hillocks, as it often does, the pit is to be opened at the foot of the declivity; which being dug inwards, till the bank is three feet high, then it is to be *caved* thus. Dig an hollow ſpace of 12 or 18 inches deep under the foot of the bank; then dig into each ſide of it another perpendicular cut of the ſame depth, and 18 inches wide from the top of the bank to the bottom: that being finiſhed, make a ſmall trench a foot or two from the brink of the bank; pour into it water till full; and when that is done, fill it again, till the water ſoaking downward makes the marle ſeparate and fall down all at once. This may be repeated till the pit riſes to 50 feet high; and then many hundreds of cart-loads of marle may be thrown down by four negroes in two hours; from whence it may be carted into cattle-pens, or laid out upon lands, as occaſion requires. Five or ſix negroes with ſpades or ſhovels will keep two or three tumbrels employed, according to the diſtance of cartage: and thus as much dung may be made by ten negro men as will dung richly at leaſt 70 or 80 acres of land every year, and laid out alſo with the aſſiſtance of cattle-carts: An improvement highly worthy every planter's conſideration, when negroes and feeding them are ſo expenſive; and this is no ſpeculation, but has been confirmed by practice. In level lands, the ſame operation may be as effectual, provided the mouth of the pit be opened by gradual deſcent to any depth: but when marle is to be found on the ſides of hills, the operation is leſs laborious for the horſes. But if the ſurface of the marle-pits (as it often happens) be covered with clay or ſtiff ſoil, ſo that the water cannot quickly ſoak from the trench above; in that caſe, pieces of hard wood, made like piles, four feet long, and four inches ſquare, pointed at one end, and ſecured at the other ſquare head by an iron clamp, may be driven by heavy mauls into the trench, as ſo many wedges, which will make the caved part tumble down: but a ſkilful eye muſt watch the laſt operation, or the labourers may be buried or hurt.

But then clay ſoils that are level, and ſubject to be drowned, or to retain water in ſtagnated pools, can never be made fruitful by any kind of manure, without being firſt well drained: for water lying upon any ſoil will moſt certainly transform it to a ſtiff unfruitful clay; as appears evidently by the bogs of Ireland, the fens of Lincoln and Cambridgeſhire, and even by the ponds of Barbadoes ſituated in the deepeſt and lighteſt black mould; for that fine ſoil being waſhed into thoſe ponds, becomes the ſtiffeſt black clay, not fit even for an ingredient in dung, until it has been laid dry, and expoſed to the ſun for a whole year: but when theſe bogs and fens are well drained, they become the moſt fruitful ſoils. Natural clay the celebrated Boerhaave thinks the fatteſt of all ſoils; but then it muſt be opened by culture, marle, or ſandy manures. It is hard to conjecture how the opinion prevailed in the Britiſh plantations, that ſandy gut-mould was moſt unfit for clay-ſoils, as being the means of binding them to the compactneſs of brick; whereas it is proved, from long experience, to be one of the beſt means of opening clay ſoils, and rendering them abundantly fruitful. Brick is made of *clay alone;* no ſand being uſed in it, farther than to ſprinkle the board, on which it is moulded into ſhape. From repeated experience it appears, that a mixture of ſand in gut-mould is the beſt of all manure for ſtiff and barren clay-lands; provided they be well drained, by throwing the whole ſoil into round ridges of 12 feet wide, with furrows of three feet wide between each ridge. And this is done with little more hand-labour than that of hoe-ploughing well in the common way. For if a piece of land be marked in lines at ſeven feet and a half diſtance from each other, and the labourers are ſet in to hoe-plough at the ſecond line, hauling back each clod 12 inches; half the ridge, and near half the furrow, is made at the ſame time: and thus a piece of land may be round-ridged, and the furrows all made at once, by the common operation of hoe-ploughing, provided the digger drives his hoe up to the eye at every ſtroke. Hoe-ploughing in clay ſoils that have lain long under water, is indeed hard labour; but it will every year grow the lighter by being well drained by round-ridging: and in the meanwhile the labour may be rendered much more eaſy by the plough conducted by the lines above deſcribed. As therefore ſandy mould is the beſt manure for ſtiff clay, ſo, by parity of reaſon, confirmed by long experience, ſtiff clay is the beſt manure for ſandy or chaffy ſoils.

The method of round-ridging before deſcribed, is, by ſeveral years experience, found the moſt eſſential improvement of flat clayey ſoils; and yet there are ſome who will prefer ſpeculation to ocular demonſtration, fancying that all kinds of ridges will carry off the mould in heavy rains. The fact is otherwiſe in clay ſoils: and plain reaſon, without experience, vouches, that where great confluxes of water are divided into many ſmall rills, the force is broken; and therefore leſs mould is carried off the land. Another objection made to round-ridgeing is, that by digging much clay to form the ſides of

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the ridge, the ſoil is impoveriſhed: but this objection ſtands good only againſt thoſe ridges which are raiſed too high, and made too broad; but if land is ridged in the manner before directed, that is, 12 feet broad, and not above ſix or eight inches higher in the middle than at the ſides, the objection vaniſhes. Ridges were never propoſed for light ſoils or ſteep lands; and even in flat ſoils upon loam they ſhould be made with great caution, becauſe *loam melts away by water*. But there are poachy lands of a white clay, even upon ſmall deſcents, too retentive of water; theſe may certainly be improved much by ridges of 12 feet wide, as above deſcribed, without fear of waſhes.

But ſuppoſing, as the objection urges, that a little clay ſhould be turned up at the ſides of ſuch ridges, can it not be manured ſomewhat more than the other parts with marle or ſandy mould, ſo as to become equally good with any other part of the ſoil? And is not this well worth the labour, ſince round-ridging not only improves the ſoil by draining it to a ſurpriſing degree, but adds one-fifth part to the depth of the ſtaple? And will not a ridge made a little rounding, throw off the water much better than a flat ridge?

The general maxim of not burning cane-traſh) which may be called the *ſtubble of cane-lands*) upon any kind of ſoil, is ſurely a great miſtake; as may be evinced by obſerving the contrary practice of the beſt huſbandmen in England, where burn-baiting or baſtard burn-baiting, is found by experience an admirable method of fertilizing cold, ſtiff, or clayey lands. It muſt indeed be a conſtant practice, not only for the ſake of contributing to warm and divide the ſoil, but as the only effectual means of deſtroying pernicious inſects, and weeds of various kinds, ſuch as French weed, wild peaſe, and wild vines.

Soon after the diſuſe of burning traſh upon our lands in the iſlands, the blaſt made its firſt appearance with incredible devaſtation: to revive that practice therefore ſeems to be the moſt obvious means of expelling it. It may be preſumed that the diſuſe of burning traſh was founded upon the miſtaken notion of burn-baiting, which is turning up a thick ſod of very dry, light, and ſhallow ſoils, and burning the whole ſuperficies or ſtaple to aſhes. This practice the writers upon huſbandry condemn univerſally, and very juſtly: for though by this practice the land will produce two or three crops more plentifully than ever, yet the ſoil is blown away by the wind, and the ſubſtratum being generally an hungry gravel or chalk, can never be reſtored to fertility by the common arts of huſbandry. But ſurely this has no reſemblance to our ſuperficial burning of the little traſh we can ſpare from dung: and though this method of burn-baiting light and ſhallow ſoils be juſtly condemned, yet the beſt writers recommend that very practice in cold, moiſt, and heavy ſoils, as is obſerved above; and long experience juſtifies it.

Deep mould upon clay or loam being ſubject to the grub-worm (c), will not take any kind of dung, till perfectly rotten, except that of the ſheep-fold; which is the beſt manure for all kinds of light ſoils, and is of all others the leaſt expenſive, as not requiring hand-labour. But the uſe of the fold is impracticable in any iſland not abounding with large ſavannas or ſheep-paſtures, as in Jamaica.

Thoſe ſoils therefore which are ſubject to the grub, and muſt be fertilized by common dung, which is a proper neſt for the mother-beetle to depoſite its eggs, muſt be well impregnated with the brine of diſſolved ſalt, after the dung is firſt cut up; two large hogſheads of ſalt will make brine enough for a dung-pen of 50 feet ſquare.

This cure for the grub is a late diſcovery; and which has been attended with ſucceſs, ſo far as the experiment is made. But though it proves effectual to deſtroy that pernicious inſect in plant-canes, it probably will not be ſufficient to ſave rattoons, without a new application of ſalt in powder; becauſe the firſt brine muſt be waſhed away by the time when rattoons ſpring up.

The planter who would ſave his rattoons from the grub ought therefore to cut off the heads of his ſtools with ſharp hoes three inches below the ſurface of the ſoil, and then ſtrew an handful of ſalt round each ſtool, and cover it up to a level with fine mould taken from the edges.

In ſoils where there is no grub, and the planter wiſhes to have very good rattoons, let him, as ſoon as his canes are cut, draw all the traſh from the ſtools into the alternate ſpaces, if planted in that manner; or into the furrows, if his land be round-ridged; and then cut off the head of his ſtools with ſharp hoes, as above directed. Experience has ſhown the advantage of this practice, and reaſon demonſtrates the great benefit of the rattoon-ſprouts riſing from three inches below the ſurface, inſtead of ſuperficial ſhoots which come to nothing, and only ſtarve the ſtrong ſprouts. Beſides, the ſtubs which are left upon the ſtools after the canes are cut, canker, and rot the ſtools; which is one reaſon why good rattoons are uncommon in ſoils long cultivated. Yet it is the opinion of ſome, that by hoe-ploughing and even dunging rattoons, the produce might be as good plant-canes, which would ſave the labour of holing and planting ſo often as planters commonly do.

Fallowing is of incredible advantage to every ſoil, not only by being divided into the minuteſt parts, but alſo by imbibing thoſe vegetative powers with which the air is impregnated by the bountiful hand of Providence, whenever rain falls. What thoſe powers are has been explained under the articles AGRICULTURE and PLANT; and experience evinces, that the tender vegetables of the earth are invigorated more by the ſmalleſt ſhower of rain, than by all the water which human art can beſtow. Let it therefore be a conſtant maxim of the planter, never to plant his ground until the ſoil is well mellowed by fallowing, even though he beſtows upon it a due proportion of dung: we ſay a due proportion; for too much will force up rank canes, which never yield good ſugar; and though ſome advantage may be reaped from the rattoons,

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(c) This pernicious inſect is moſt apt to engender in dung made from mill traſh, which therefore never ought to be put into dung-compoſt or ſtill-ponds; but after being burnt, the aſhes will be as good as any other kind. Round-ridging, with manure of unwet aſhes, ſea-ſand, or lime, or dry marle, kills the grub.

Planter-ſhip.

toons, yet it will be found by experience not to compenſate the loſs by the plants. In ſtony or ſteep ſoils, where the plough cannot be uſed, or where a ſufficient ſtrength of cattle cannot be ſupported for that purpoſe, hand-labour or hoe-ploughing muſt be ſubſtituted: but even in that caſe, much labour may be ſaved by ſpreading the dung according to the Engliſh huſbandry, and digging it into the ſoil. To evince this truth, let any planter compute his negroes labour of diſtributing dung by baſkets, and by ſpreading it with dung-forks; and then judge for himſelf by one ſingle experiment which is the moſt profitable.

But if ſome planters are ſo devoted to the old cuſtom of diſtributing dung by baſkets inſtead of wheel-barrows in level ground, or hand-barrows in uneven land, by which three times the labour may be accompliſhed in the ſame time and by the ſame hands; let them at leaſt ſave much of their hand-labour, by the following method of laying out dung, before the diſtribution by baſkets.

In holing a piece of land, let a ſpace be left after 80 holes from the firſt interval, and then the like ſpace after 80 holes throughout the whole plat, which ſpaces muſt run exactly parallel to the intervals on the right and left of the holes. Into theſe ſpaces the dung may be carted, even before it be rotten (D), at the moſt leiſure times, and covered with mould or cane-traſh, to prevent exhalation; and in ſuch quantity as will ſuffice only to dung a row of 40 holes, from the point oppoſite to each ſide of it. In the intervals at each ſide of the cane-piece, which are parallel to thoſe ſpaces, there muſt be dung enough carted to manure a row of 40 holes, and covered in like manner.

By thus placing the dung or gut-mould, it is evident at the firſt ſight, that the fartheſt diſtance cannot be above 40 holes in diſtributing the dung: and in caſe it be not ſufficiently rotten for preſent uſe, it may be diſtributed even in dry weather, and covered by the bank; which will both prevent its ſpirit from exhalation, and occaſion it to rot ſooner, which is no ſmall advantage. Moreover, by being thus laid out at the moſt leiſure times, and covered with the banks, the dung will be more intimately mixed with the ſoil, and therefore continue to nouriſh the plant for a longer time than if laid as uſual at the bottom of the holes. A farther advantage of thus diſtributing the dung, and covering it, reſults from the more expeditious planting the land after a ſhort or ſudden ſhower: for the labour of covering the dung, and uncovering it when the land is planted, however it may appear in ſpeculation, is in practice a trifle; and beſides all the other advantages ariſing by the diſtribution of dung from the ſpaces above deſcribed, this is not the leaſt, that not a bank is trodden under foot. But it is evident, that by diſtributing the dung with baſkets in the preſent method, the ſoil is much trampled under foot; and by that means, the very end of hoe-ploughing, or looſening the ſoil, is much defeated. In like manner, by the preſent method of hoe-ploughing, the ſame ill effect is produced; for as the negroes hoe-plough or dig the ſoil directly forward, ſo they muſt neceſſarily tread the ground as faſt as they dig it: whereas by putting the labourers to dig ſidewiſe, no one puts a foot upon the ſoil after it is dug; and by lining the land before it is hoe-ploughed, each negro may have an equal ſhare to dig. The only difficulty of hoe-ploughing ſidewiſe is in firſt ſetting the negroes to that work; but it may be done without loſs of time when working in a contiguous field. Whether hoe-ploughing before or after the land be holed for canes is moſt eligible, experience muſt determine; but certainly both operations will be moſt effectual: and therefore it will be adviſable (E), firſt to plough the ſoil where the land will admit the plough; and where it will not, to hoe-plough it with or without dung, as requiſite; then let it lie fallow till perfectly mellowed; then hole and plant it; and inſtead of weeding in the uſual manner, let the weeds in all the ſpaces be dug into the ſoil: but as this is not to be done ſo well with the hoe, it is ſubmitted to future experience, whether the dexterous uſe of ſpades, as in England, will not anſwer the purpoſe much better, and with equal diſpatch. But whatever method is preferred, moſt certain it is, that by looſening the ſoil in all the ſpaces between the young canes after being come up, their fibres will more eaſily expand on every ſide, and acquire more nutrition to invigorate their growth. But where the planter grudges this labour by thinking it needleſs in a rich looſe ſoil, he may diſpatch more weeding-work by the Dutch hoe than by any other; which being faſtened upon the end of a ſtick, is puſhed forward under the roots of the ſmall weeds, in ſuch a manner as to cut them up a little below the ſurface of the ſoil, and will do more execution at one ſhove than can be done at three ſtrokes of the common hoe: but there is yet another practice of the horſe-hoe plough, whereby all weeds growing in rows between beans and peaſe, are extirpated with incredible eaſe and expedition. It is a very ſimple machine, drawn by one or two horſes, conſiſting of a pair of low wheels turning upon a common axis; from whence two ſquare irons are let down at equal diſtances, and triangular hoes made at the ends, the points of the triangles being placed forward, and ſo fixed as to cut all weeds an inch below the ſurface, in the ſame manner as the Dutch garden-hoe above-mentioned. By this machine a man and a boy, with two horſes or mules, will clear perfectly all the ſpaces of a field of ten acres in two days, and may be of admirable uſe in all looſe and dry ſoils in the ſugar-iſlands: for while two horſes or mules draw in the ſpace before each other, the wheels paſs on the outſide of each row of canes, without doing the leaſt injury, while the plough-

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(D) In order to make dung rot the ſooner, much labour is beſtowed in digging and turning it over by hoes: but two-thirds of that labour may be ſaved by the uſe of hay-knives; ſix of which, uſed dexterouſly, will cut up a pen in leſs time than 60 negroes can do by hoes: but hay-knives cannot be uſed where gritty mould is employed in pens.

(E) Deep and looſe ſoils may be ploughed with a ſmall ſtrength of cattle or mules: but ſtiff lands in hot climates require more ſtrength of cattle than can be maintained in the ſmall paſtures of the planters; for if thoſe ſtrong ſoils are either too wet or too dry (as is generally the caſe), ploughing is impracticable.

plough-holder attends to his buſineſs. In ſtiff ſoils which require draining, neither the horſe-hoe plough nor the Dutch hoe can be proper; or any other inſtrument ſo effectual as the ſpade uſed in the manner above hinted, where the ſtaple is deep.

But where the ſtaple of land is ſhallow, care muſt be taken not to dig much below it, according to the univerſal opinion of all the beſt writers, ſupported by the experience of 100 years. Yet ſome good planters are fallen into the contrary practice, and dig up ſtiff clay far below the ſtaple. This, Mr Martin ſays, was done in his own lands, during his abſence, by injudiciouſly ploughing below the ſtaple; and ſo injured the ſoil, that all the arts of culture for many years hardly retrieved its former fertility. Indeed, where the ſtaple is ſhallow, upon a fat clay, the turning up a little of it at a time, from the bottom of the cane-holes, and mixing it with rich hot dung, made of marle, or ſandy mould, which may take off its coheſive quality, will in due time, and by long fallow, convert it into good ſoil: but if ſtiff clay be turned up, without any ſuch mixture, in large quantities, it will infallibly diſappoint the operator's hopes: for though ſolid clay will moulder, by expoſure, to a ſeeming fine earth, yet it will return to its primitive ſtate very ſoon after being wet, and covered from the external air, if not divided, as above ſuggeſted.

After all, the common horſe-hoeing plough drawn by two mules in a line before each other, or the hand-hoe in common uſe, will anſwer the purpoſe very well, where the lands are planted in Mr Tull's method; that is, where the ſpaces are equal to the land planted, in the following manner.

Suppoſe ſix feet planted in two rows of canes, and ſix feet of land left as a ſpace unplanted; and ſo a whole piece of land, planted in alternate double rows (F), with equal ſpaces, may be hoe-ploughed with eaſe, as before hinted; and that at any time during the growth of canes, when it is moſt convenient to the planter, which is a conſiderable advantage; and yet it is the leaſt of all attending this method of culture: for, by leaving theſe ſpaces, the canes will have both more air and ſun: by hoe-ploughing them, the roots of each double row will have large room for expanſion, and conſequently, by gaining more nutriment, will grow more luxuriantly: by theſe ſpaces the canes may be cleaned from the blaſt with much more eaſe and convenience: and will ſerve as proper beds to plant great corn, without the leaſt injury to the canes; as well as to contain the traſh taken off the land, where, by rotting, and being hoe-ploughed into the ſoil, it will wonderfully enrich it, and will fit it to be planted immediately after the canes in the neighbouring double rows are cut down. Beſides all theſe admirable advantages of planting the land in alternate double rows with equal ſpaces, the canes, when at full age, may be eaſily ſtripped of their traſh, and by that means the juice rendered ſo mature as to yield double the produce, and much better ſugars than unſtripped canes. This method of culture may be recommended for all kinds of ſoil: for as by this practice the rank luxuriant canes will be more matured, ſo the poor ſoils will be rendered more fruitful; and as the roots of the canes which expand into theſe ſpaces will be kept moiſt by being covered with rotten traſh, ſo they muſt bear dry weather much longer in the burning ſoils. In thoſe low lands which require draining by furrows, the alternate double rows and ſpaces muſt be made croſs the ridges; by which means thoſe ſpaces, being hoe-ploughed from the centre to the ſides, will be always preſerved in a proper ſtate of roundneſs. By this method of planting, the canes may be ſo well ripened as to yield double the quantity of ſugar of canes planted in the cloſe manner; which ſaves half the labour of cartage, half the time of grinding and boiling, and half the fuel, beſides yielding finer ſugar.

Yet, how well ſoever the method of planting in ſingle or double alternate rows has ſucceeded in the looſe and ſtiff ſoils, experience has ſhown that it is a wrong practice in ſtiff lands that are thrown into round or flat ridges: for theſe being moſt apt to crack, the ſun-beams penetrate ſoon to the cane-roots, ſtop their growth, and have an ill influence upon the ſugar. It is therefore adviſable to plant ſuch lands full, but in large holes, of 4 feet, by 5 feet towards the banks: after the plant-canes are cut, to dig out one, and leave two rows ſtanding, hoe-ploughing the ſpaces after turning all the traſh into furrows till almoſt rotten: for if the traſh is drawn upon the hoe-ploughed ſpaces, they will hardly ever moulder, at leaſt not till the traſh is quite rotten. This is an infallible proof from experience of how little advantage traſh is to the ſoil, unleſs it be in great droughts, to keep out the intenſe ſun-beams: for, in all other reſpects, it prevents that joint operation of the ſun and air in mouldering and fructifying the ſoil, as has been proved by repeated experiments.

But in flat ſtiff ſoils that are properly drained by round-ridging, no culture prevents cracking ſo effectually as hoe-ploughing into them a qantity of looſe marle, of which that of a chocolate or of a yellow colour is beſt; and it will be ſtill much better, by lying upon the land, in ſmall heaps, or in cane-holes, for ſome time, to imbibe the vegetative powers of the air before it is intimately mixed with the ſoil.

As to the manner of planting canes, the general practice of allowing four feet by five to an hole, and two freſh (G) plants, is found by common experience to be right and good in alternate rows. But the following precautions are neceſſary to be obſerved. Firſt, let all the cane-rows run eaſt and weſt, that the trade-wind may paſs freely through them; becauſe air and ſunſhine are as conducive to the growth and maturation of ſugar-canes as of any other vegetable. Secondly, let not any acceſſion of mould be drawn into hills round the young canes, except where water ſtagnates (H); becauſe the fibres which run horizontally, and near the ſurface, are much

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(F) In ſtiff lands, the ſingle alternate rows of four feet diſtance, as preventive of much labour in weeding, are found beſt; and alſo yield more ſugar by the acre; and are leſs apt to be affected by drought.

(G) It is an odd fancy that ſtale plants grow beſt, when both reaſon and experience vouch that the moſt ſucculent plants are beſt: one good plant in the centre of a large hole is ſufficient when the land is full holed.

(H) The ſtagnation of water in pools (uſual in ſtiff level lands) is the moſt injurious circumſtance attending it; for much broken and ſpoiled by that practice. Thirdly, let the ſugar-canes be cut at their full maturity: which, in a dry looſe mold, is generally at the end of 14 or 15 months after being planted; but in a ſtiff clay ſoil, not till 16 or 17 months. Fourthly, as the cane-rows run eaſt and weſt in as proper a direction as poſſible for cartage to the ſugar works, ſo canes muſt be cut the contrary way if the planter expects any great produce from his rattoons: for by beginning to cut canes at the part of his field moſt remote from the works, the carts cannot often paſs over the ſame tract, and conſequently the cane-ſtools cannot be injured, more eſpecially if he takes due care to cut the canes very cloſe to their roots; for, by leaving a long ſtub (which muſt periſh) the cane-ſtools are much injured. It may be objected to the practice of cutting canes tranſverſely to the rows, that the negroes labour will not be ſo equally divided: but let every man conſider both ſides of the queſtion, and be determined by his own experience; and then he will be convinced, that it matters very little which way he cuts ſtraight ſtanding canes; but in caſes where the ſugar-canes lean, or are lodged by preceding high winds, it is a point of great importance to place the labourers ſo as to cut the canes firſt at the roots, and then, drawing them, cut off the tops: for thus by two ſtrokes each cane will be cut; and twice the quantity cut in the ſame time, and by the ſame hands, more than by cutting in any other direction. In round-ridged land, it is proper to cut canes in the ſame direction of the ridges, throwing the tops and traſh into the furrows to render the cartage eaſy, and to preſerve the ridges in their proper form.

It is almoſt needleſs to ſuggeſt the expediency of planning the cane-pieces of a plantation in exact ſquares, ſo that the intervals may interſect at right angles; ſince ſuch regularity is not only more beautiful, more ſafe in caſe of accidental fires, and a better diſpoſition of the whole for dividing and planting one third or fourth part of a plantation every year, but alſo much eaſier guarded by a few watchmen: for one of theſe walking in a line from eaſt to weſt, and the other from north to ſouth, look through every avenue, where the moſt ſubtle thief cannot eſcape the watchful eye. And if the intervals ſurrounding the boundary of a regular plantation be made 24 feet wide, the proprietor will receive ample recompenſe for ſo much land, by the ſecurity of his canes from fires kindled in the neighbourhood, and by planting all that land in plantain-trees, which may at once yield food and ſhade to the watchmen, who by that means can have no excuſe for abſence from their proper ſtations. But as fuel grows very ſcarce in moſt of our iſlands, it is alſo expedient to plant a logwood or flower-fence in all the boundaries of every plantation, which, being cut every year, will furniſh good ſtore of faggots. Logwood makes the ſtrongeſt and quickeſt of all fences, and agrees with every ſoil: the cuttings make excellent oven-fuel.

So much for the general operations of planterſhip, according to the approved directions of Mr Martin. For the particular cultivation of the ſugar-canes, the extraction of the ſugar, and the diſtillation of rum, ſee the articles SUGAR, and RUM.

PLANTING, in *Agriculture* and *Gardening*, is ſetting a tree or plant, taken from its proper place, in a new hole or pit; throwing freſh earth over its root, and filling up the hole to the level of the ſurface of the ground.

The firſt thing in planting is to prepare the ground before the trees or plants are taken out of the earth, that they may remain out of the ground as ſhort a time as poſſible; and the next is, to take up the trees or plants, in order to their being tranſplanted. In taking up the trees, carefully dig away the earth round the roots, ſo as to come at their ſeveral parts to cut them off; for if they are torn out of the ground without care, the roots will be broken and bruiſed, to the great injury of the trees. When you have taken them up, the next thing is to prepare them for planting by pruning the roots and heads. And firſt, as to the roots; all the ſmall fibres are to be cut off, as near to the place from whence they are produced as may be, except they are to be replanted immediately after they are taken up. Then prune off all the bruiſed or broken roots, all ſuch as are irregular and croſs each other, and all downright roots, eſpecially in fruit-trees: ſhorten the larger roots in proportion to the age, the ſtrength, and nature of the tree; obſerving that the walnut, mulberry, and ſome other tender-rooted kinds ſhould not be pruned ſo cloſe as the more hardy ſorts of fruit and foreſt trees: in young fruit-trees, ſuch as pears, apples, plums, peaches, &c. that are one year old from the time of their budding or grafting, the roots may be left only about eight or nine inches long; but in older trees, they muſt be left of a much greater length: but this is only to be underſtood of the larger roots; for the ſmall ones muſt be chiefly cut quite out, or pruned very ſhort. The next thing is the pruning of their heads, which muſt be differently performed in different trees; and the deſign of the trees muſt alſo be conſidered. Thus, if they are deſigned for walls or eſpaliers, it is beſt to plant them with the greateſt part of their heads, which ſhould remain on till they begin to ſhoot in the ſpring, when they muſt be cut down to five or ſix eyes, at the ſame time taking care not to diſturb the roots. But if the trees are deſigned for ſtandards, you ſhould prune off all the ſmall branches cloſe to the place where they are produced, as alſo the irregular ones which croſs each other; and after having diſplaced theſe branches, you ſhould alſo cut off all ſuch parts of branches as have by any accident been broken or wounded; but by no means cut off the main leading ſhoots which are neceſſary to attract the ſap from the root, and thereby promote the growth of the tree. Having thus prepared the trees for planting, you muſt now proceed to place them in the earth: but firſt, if the trees have been long out of the ground, ſo that the fibres of the roots are dried, place them eight or ten hours in water, before they are planted, with their heads erect, and the roots only immerſed therein; which

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for that, by long duration, will convert the freſh mould into ſtiff clay. The proprietor of ſuch a ſoil need therefore grudge no labour to drain it well; and yet he ſhould very [illegible] to prevent the mould from being waſhed away by great floods, in caſe the under ſtratum be a loam.

which will ſwell the dried veſſels of the roots, and prepare them to imbibe nouriſhment from the earth. In planting them, great regard ſhould be had to the nature of the ſoil: for if that be cold and moiſt, the trees ſhould be planted very ſhallow; and if it be a hard rock or gravel, it will be better to raiſe a hill of earth where each tree is to be planted, than to dig into the rock or gravel, and fill it up with earth, as is too often practiſed, by which means the trees are planted as it were in a tub, and have but little room to extend their roots. The next thing to be obſerved is, to place the trees in the hole in ſuch a manner that the roots may be about the ſame depth in the ground as before they were taken up; then break the earth fine with a ſpade, and ſcatter it into the hole, ſo that it may fall in between every root, that there may be no hollowneſs in the earth: then having filled up the hole, gently tread down the earth with your feet, but do not make it too hard; which is a great fault, eſpecially if the ground be ſtrong or wet. Having thus planted the trees, they ſhould be faſtened to ſtakes driven into the ground to prevent their being diſplaced by the wind, and ſome mulch laid upon the ſurface of the ground about their roots; as to ſuch as are planted againſt walls, their roots ſhould be placed about five or ſix inches from the wall, to which their heads ſhould by nailed to prevent their being blown up by the wind. The ſeaſons for planting are various, according to the different ſorts of trees, or the ſoil in which they are planted. For the trees whoſe leaves fall off in winter, the beſt time is the beginning of October, provided the ſoil be dry; but if it be a very wet ſoil, it is better to defer it till the latter end of February, or the beginning of March: and for many kinds of evergreens, the beginning of April is by far the beſt ſeaſon; though they may be ſafely removed at midſummer, provided they are not to be carried very far; but ſhould always make choice of a cloudy wet ſeaſon.

In the ſecond volume of the papers, &c. of the Bath Society there is a letter on planting waſte grounds. The gentleman who writes it informs us, that in the county of Norfolk, where he reſides, there were about 60 or 70 years ago vaſt tracts of uncultivated ground, which were then thought totally barren. "The weſtern parts of it (ſays he) abounded with ſand of ſo light a texture, that they were carried about by every wind; and in many places the ſands were ſo looſe that no graſs could grow upon them. Art and induſtry, however, have now ſo altered the face of this once Arabian deſert, that it wears a very different appearance. Moſt of theſe tracts are either planted or rendered very good corn-land and ſheep-walks.

"About 30 years ſince, the ſides of many of our little ſand-hills were ſown with the ſeeds of French furze, and when a wet ſeaſon followed, they ſucceeded very well, and grew ſo faſt, that once in three or four years they are cut for fuel, and ſell at a good price at Thetford, Brandon, Harling, Swaffham, and places adjacent. This excited ſome public-ſpirited gentlemen, among whom was the late Mr Buxton of Shadwell-Lodge, near Thetford, to attempt the planting of Scotch and ſpruce firs, and other hardy foreſt trees. At firſt they found ſome difficulty from the extreme looſeneſs of the ſand. But as there is in all this part of the country fine white and yellow marle, at about three feet depth below the ſand, they very judiciouſly thought that incorporating it with the ſand in the holes where their young trees were planted, would inſure ſucceſs; nor were they diſappointed. The method ſucceeded beyond expectation; the plantations throve exceedingly, and the roots ſoon reached below the ſand, after which they were out of danger. This excited them to further attempts.

"On the ſpots where they intended to raiſe new plantations from ſeeds and acorns, they laid on a thick coat of marle and clay, which after being rough ſpread, and lying a winter in that ſtate, was made fine, and ploughed in juſt before planting. By theſe means the ſoil became fixed, and in a little time covered with graſs and herbage; ſo that there are now vaſt plantations of firs, oak, and foreſt-trees, in the moſt healthy and vigorous ſtate, where within my memory ten acres of land would not maintain a ſingle ſheep three months.

"But the benefit of plantations, whether of ſhrubs, copſe, or trees, is not confined to the immediate advantage, or even the future value of the wood. By annually ſhedding a great number of leaves, which the winds diſperſe, and the rains waſh into the ſoil, it is conſiderably improved; and whenever ſuch copſes have been ſtubbed up, the ground (however unfruitful before planting) has thereby been ſo enriched as to bear excellent crops for many years, without the additional help of manure. How much land-owners are intereſted in planting waſte or barren ſpots I need not mention; and nothing but a degree of indolence or ignorance unpardonable in this enlightened age could induce them to neglect it.

"Nature has furniſhed us with plants, trees, and ſhrubs, adapted to almoſt every ſoil and ſituation; and as the laws of vegetation are now much better underſtood than formerly, it is a reproach to thoſe whoſe practice does not keep pace with their knowledge in making the beſt uſe of her bounty. Let no man repine and ſay *the land is barren;* for thoſe ſpots which appear to be ſo, owe that appearance to human negligence. Induſtry and art might ſoon render an eighth part of this kingdom nearly as valuable as the reſt, which now remains in a ſtate unprofitable to the owners, and diſgraceful to the community."

Reverſe PLANTING, a method of planting in which the natural poſition of the plant or ſhoot is inverted; the branches being ſet into the earth, and the root reared into the air. Dr Agricola mentions this monſtrous method of planting, which he found to ſucceed very well in moſt or all ſorts of fruit-trees, timber-trees, &c. Bradley affirms, that he has ſeen a lime-tree in Holland growing with its firſt roots in the air, which had ſhot out branches in great plenty, at the ſame time that its firſt branches produced roots and fed the tree. Mr Fairchild of Hoxton has practiſed the ſame with us, and gives the following directions for performing it: Make choice of a young tree of one ſhoot, of alder, elm, willow, or any other tree that eaſily takes root by laying; bend the ſhoot gently down into the earth, and ſo let it remain until it has taken root. Then dig about the firſt root, and raiſe it gently out of the ground, till the ſtem be nearly upright, and ſtake it up. Then prune the roots, now erected in the air, from the bruiſes and wounds they received in being dug up; and anoint the pruned parts with a compoſition of two ounces of turpentine, four ounces of tallow, and four ounces of bees wax, melted together, and applied pretty warm. Afterwards prune off all the buds or ſhoots that are upon the ſtem, and dreſs the wounds with the ſame compoſition, to prevent any collateral ſhootings, that might ſpoil the beauty of the ſtem.

PLANUDES, Maximus, a Greek monk of Conſtantinople, towards the end of the 14th century, who publiſhed a collection of epigrams intitled *Anthologia*; a Greek tranſlation of Ovid's Metamorphoſes; a Life of Æſop, which is rather a romance than a hiſtory; and ſome other works. We know nothing more of him, than that he ſuffered ſome perſecution on account of his attachment to the Latin church.

PLASHING *of* Hedges, is an operation thought by ſome perſons to promote the growth and continuance of old hedges; but whether the fact be ſo or not will admit of ſome diſpute. See Hedges.

It is performed in this manner: The old ſtubs muſt be cut off, &c. within two or three inches of the ground; and the beſt and longeſt of the middle-ſized ſhoots muſt be left to lay down. Some of the ſtrongeſt of theſe muſt alſo be left to anſwer the purpoſe of ſtakes. Theſe are to be cut off to the height at which the hedge is intended to be left; and they are to ſtand at ten feet diſtance one from another: when there are not proper ſhoots for theſe at the due diſtances, their places muſt be ſupplied with common ſtakes of dead wood. The hedge is to be firſt thinned, by cutting away all but thoſe ſhoots which are intended to be uſed either as ſtakes, or the other work of the plaſhing: the ditch is to be cleaned out with the ſpade; and it muſt be now dug as at firſt, with ſloping ſides each way; and when there is any cavity on the bank on which the hedge grows, or the earth has been waſhed away from the roots of the ſhrubs, it is to be made good by facing it, as they expreſs it, with the mould dug from the upper part of the ditch: all the reſt of the earth dug out of the ditch is to be laid upon the top of the bank: and the owner ſhould look carefully into it that this be done; for the workmen, to ſpare themſelves trouble, are apt to throw as much as they can upon the face of the bank; which being by this means overloaded, is ſoon waſhed off into the ditch again, and a very great part of the work undone; whereas what is laid on the top of the bank always remains there, and makes a good fence of an indifferent hedge.

In the plaſhing the quick, two extremes are to be avoided; theſe are, the laying it too low, and the laying it too thick. The latter makes the ſap run all into the ſhoots, and leaves the plaſhes without ſufficient nouriſhment; which, with the thickneſs of the hedge, finally kills them. The other extreme of laying them too high, is equally to be avoided; for this carries up all the nouriſhment into the plaſhes, and ſo makes the ſhoots ſmall and weak at the bottom, and conſequently the hedge thin. This is a common error in the north of England. The beſt hedges made anywhere in England are thoſe in Hertfordſhire; for they are plaſhed in a middle way between the two extremes, and the cattle are by that prevented both from cropping the young ſhoots, and from going through; and a new and vigorous hedge ſoon forms itſelf.

When the ſhoot is bent down that is intended to be plaſhed, it muſt be cut half way through with the bill: the cut muſt be given ſloping, ſomewhat downwards, and then it is to be wound about the ſtakes, and after this its ſuperfluous branches are to be cut off as they ſtand out at the ſides of the hedge. If for the firſt year or two, the field where a new hedge is made can be ploughed, it will thrive the better for it; but if the ſtubs are very old, it is beſt to cut them quite down, and to ſecure them with good dead hedges on both ſides, till the ſhoots are grown up from them ſtrong enough to plaſh; and wherever void ſpaces are ſeen, new ſets are to be planted to fill them up. A new hedge raiſed from ſets in the common way, generally requires plaſhing in about eight or nine years after.

PLASSEY, is a grove near the city of Muxadab in India, famous for a battle fought between the Engliſh under Lord Clive, and the native Hindoos under the nabob Surajah Dowlah. The Britiſh army conſiſted of about 3200 men, of whom the Europeans did not exceed 900; while that of the nabob conſiſted of 50,000 foot, and 18,000 horſe. Notwithſtanding this great diſproportion, however, Lord Clive effectually routed the nabob and his forces, with the loſs of three Europeans and 26 Seapoys killed, and five Europeans and 40 Seapoys wounded. The nabob's loſs was eſtimated at about 200 men, beſides oxen and elephants. See Clive.

PLASTER, or Emplaster, in *Pharmacy*, an external application of a harder conſiſtence than an ointment; to be ſpread, according to the different circumſtances of the wound, place, or patient, either upon linen or leather.

Plaster, or *Plaiſter*, in building, a compoſition of lime, ſometimes with ſand, &c. to parget, or cover the nudities of a building. See Pargeting and Stucco.

Plaster of Paris, a preparation of ſeveral ſpecies of gypſum dug near Mount Martre, a village in the neighbourhood of Paris; whence the name. See Alabaster, Gypsum, and Sulphate of Lime, under Chemistry.

The beſt ſort is hard, white, ſhining, and marbly; known by the name of *plaſter-ſtone* or *parget of Mount Martre*. It will neither give fire with ſteel, nor ferment with aquafortis; but very freely and readily calcines in the fire into a fine plaſter, the uſe of which in building and caſting ſtatues is well known.

The method of repreſenting a face truly in plaſter of Paris is this: The perſon, whoſe figure is deſigned, is laid on his back, with any convenient thing to keep off the hair. Into each noſtril is conveyed a conical piece of ſtiff paper, open at both ends, to allow of reſpiration. Theſe tubes being anointed with oil, are ſupported by the hand of an aſſiſtant; then the face is lightly oiled over, and the eyes being kept ſhut, alabaſter freſh calcined, and tempered to a thinniſh conſiſtence with water, is by ſpoonfuls nimbly thrown all over the face, till it lies near the thickneſs of an inch. This matter grows ſenſibly hot, and in about a quarter of an hour hardens into a kind of ſtony concretion; which being gently taken off, repreſents, on its concave ſurface, the minuteſt part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other neceſſary amendments made. This ſecond face being anointed with oil, a ſecond mould of calcined alabaſter is made, conſiſting of two parts joined lengthwiſe along the ridge of the noſe; and herein may be caſt, with the ſame matter, a face extremely like the original.

If finely powdered alabaſter, or plaſter of Paris, be put into a veſſel over a fire, it will, when hot, aſſume the appearance of a fluid, by rolling in waves, yielding to the touch, ſteaming, &c. all which properties it again loſes on the departure of the heat: and being thrown upon paper, will not at all wet it, but immediately diſcover itſelf to be as motionleſs as before it was ſet over the fire; whereby it appears, that a heap of ſuch little bodies, as are neither ſpherical nor otherwiſe regularly ſhaped, nor ſmall enough to be below the diſcernment of the eye, may, without fuſion, be made fluid, barely by a ſufficiently ſtrong and various agitation of the particles which compoſe it; and moreover loſe its fluidity immediately upon the ceſſation thereof.

Two or three ſpoonfuls of burnt alabaſter, mixed up thin with water, in a ſhort time coagulate, at the bottom of a veſſel full of water, into a hard lump, notwithſtanding the water that ſurrounded it. Artificers obſerve, that the coagulating property of burnt alabaſter will be very much impaired or loſt, if the powder be kept too long, eſpecially if in the open air, before it is made uſe of; and when it hath been once tempered with water, and ſuffered to grow hard, they cannot, by any burning or powdering of it again, make it ſerviceable for their purpoſe as before.

This matter, when wrought into veſſels, &c. is ſtill of ſo looſe and ſpongy a texture, that the air has eaſy paſſage through it. Mr Boyle gives an account, among his experiments with the air-pump, of his preparing a tube of this plaſter, cloſed at one end and open at the other; and on applying the open end to the cement, as is uſually done with the receivers, it was found utterly impoſſible to exhauſt all the air out of it; for freſh air from without preſſed in as faſt as the other, or internal air, was exhauſted, though the ſides of the tube were of a conſiderable thickneſs. A tube of iron was then put on the engine; ſo that being filled with water, the tube of plaſter of Paris was covered with it; and on uſing the pump, it was immediately ſeen, that the water paſſed through into it as eaſily as the air had done, when that was the ambient fluid. After this, trying it with Venice turpentine inſtead of water, the thing ſucceeded very well; and the tube might be perfectly exhauſted, and would remain in that ſtate ſeveral hours. After this, on pouring ſome hot oil upon the turpentine, the caſe was much altered; for the turpentine melting with this, that became a thinner fluid, and in this ſtate capable of paſſing like water into the pores of the plaſter. On taking away the tube after this, it was remarkable that the turpentine, which had pervaded and filled its pores, rendered it tranſparent, in the manner that water gives tranſparency to that ſingular ſtone called *oculus mundi*. In this manner, the weight of air, under proper management, will be capable of making ſeveral ſorts of glues penetrate plaſter of Paris; and not only this, but baked earth, wood, and all other bodies, porous enough to admit water on this occaſion.

Plaſter of Paris is uſed as a manure in Penſylvania, as we find mentioned in a letter from a gentleman in that country inſerted in the 5th volume of the Bath Society Papers, and which we ſhall inſert here for the ſatisfaction and information of our agricultural readers. "The beſt kind is imported from hills in the vicinity of Paris: it is brought down the Seine, and exported from Havre de Grace. I am informed there are large beds of it in the bay of Fundy, ſome of which I have ſeen nearly as good as that from France; nevertheleſs ſeveral cargoes brought from thence to Philadelphia have been uſed without effect. It is probable this was taken from the top of the ground, and by the influence of the ſun and atmoſphere diſpoſſeſſed of the qualities neceſſary for the purpoſes of vegetation. The lumps compoſed of flat ſhining ſpeculæ are preferred to thoſe which are formed of round particles like ſand: the ſimple method of finding out the quality is to pulverize ſome, and put it dry into an iron pot over the fire, when that which is good will ſoon boil, and great quantities of the fixed air eſcape by ebullition. It is pulverized by firſt putting it in a ſtamping-mill. The finer its pulverization the better, as it will thereby be more generally diffuſed.

Plaſter

"It is beſt to ſow it in a wet day. The moſt approved quantity for graſs is ſix buſhels per acre. No art is required in ſowing it more than making the diſtribution as equal as poſſible on the ſward of graſs. It operates altogether as a top manure, and therefore ſhould not be put on in the ſpring until the principal froſts are over and vegetation hath begun. The general time for ſowing with us is in April, May, June, July, Auguſt, and even as late as September. Its effects will generally appear in 10 or 15 days; after which the growth of the graſs will be ſo great as to produce a large burden at the end of ſix weeks after ſowing.

"It muſt be ſown on dry land, not ſubject to be overflown. I have ſown it on ſand, loam, and clay, and it is difficult to ſay on which it has beſt anſwered, although the effect is ſooner viſible on ſand. It has been uſed as a manure in this ſtate for upwards of 12 years. Its duration may, from the beſt information I can collect, be eſtimated from 7 to 12 years; for, like other manure, its continuance very much depends on the nature of the ſoil on which it is placed.

"One of my neighbours ſowed ſome of his graſs ground ſix years ago, another four years ago; a great part of my own farm was ſown in May 1788. We regularly mow two crops, and paſture in autumn; no appearance of failure, the preſent crop being full as good as any preceding. I have this ſeaſon mowed 50 acres of red clover, timothy graſs, white clover, &c. which was plaſtered laſt May, July, and September: many who ſaw the graſs eſtimated the produce at two tons per acre, but I calculate the two crops at three tons. Several ſtripes were left in the different fields without plaſter; theſe were in a meaſure unproductive, being ſcarcely worth mowing. In April 1788, I covered a piece of graſs land upwards of two inches thick with barn manure; in the ſame worn-out field I ſowed plaſter, to contraſt it with the dung. I mowed the dunged and plaſtered land twice laſt year and once this; in every crop the plaſter has produced the moſt. You will remember, in all experiments with clover, to mix about one-third timothy graſs ſeed; it is of great advantage in ſerving as a ſupport for the clover; it very much facilitates the curing of clover, and when cured is a ſuperior fodder. The plaſter operates equally as well on the other graſſes as on clover. Its effect is ſaid to be good on wheat, if ſown in the ſpring; but I cannot ſay this from experience. On Indian corn I know its operation to be great; we use it at the rate of a table spoonful to a hill, put in immediately after dropping.

"From some accurate experiments last year made and reported to our Agricultural Society, it appears that nine bushels of Indian corn per acre were produced by this method of using plaster."

PLASTERING. See PARGETING.

PLASTIC, denotes a thing endued with a formative power, or a faculty of forming or fashioning a mass of matter after the likeness of a living being.

Plastic Nature, a certain power by which, as an instrument, many philoſophers, both ancient and modern, have ſuppoſed the great motions in the corporeal world, and the various phenomena of generation and corruption, to be perpetually carried on.

Among the philoſophers of Greece, ſuch a power was almoſt univerſally admitted. It ſeems, indeed, to have been rejected only by the followers of Democritus and Epicurus, who talk as if they had thought gravity eſſential to matter, and the *fortuitous* motion of atoms, which they held to have been from eternity, the cauſe not only of all the *regular* motions in the univerſe, but alſo of the *organization* of all corporeal ſyſtems, and even of *ſenſation* and *intellection*, in brutes and in men. It is needleſs to ſay, that thoſe men, whatever they might profeſs, were in reality atheiſts; and Democritus, it is univerſally known, avowed his atheiſm.

The greater part of the philoſophers who held the exiſtence of a plaſtic nature, conſidered it not as an *agent* in the ſtrict ſenſe of the word, but merely as an inſtrument in the hand of the Deity; though even among them there were ſome who held no ſuperior power, and were of courſe as groſs atheiſts as Democritus himſelf. Such was *Strato* of Lampſacus. This man was originally of the peripatetic ſchool, over which he preſided many years, with no ſmall degree of reputation for learning and eloquence. He was the firſt and chief aſſertor of what has been termed *Hylozoic atheiſm*; a ſyſtem which admits of no power ſuperior to a certain *natural* or *plaſtic life, eſſential, ingenerable*, and *incorruptible*, inherent in matter, but without ſenſe and conſciouſneſs. That ſuch was his doctrine we learn from Cicero, who makes *Velleius* the Epicurean ſay, "Nec audiendus *Strato*, qui *Phyſicus* appellatur, qui omnem vim divinam in Natura ſitam eſſe cenſet, quæ cauſas gignendi, augendi, minuendive habeat, ſed careat omni ſenſu *." That Strato in admitting this plaſtic principle, differed widely from Democritus, is apparent from the following account of him by the ſame author. "*Strato Lampſacenus* negat opera deorum ſe uti ad fabricandum mundum, quæcunque ſint docet omnia eſſe effecta *natura*, nec ut ille, qui aſperis, et levibus, et hamatis uncinatiſque corporibus concreta hæc eſſe dicat, interjecto inani; ſomnia cenſet hæc eſſe *Democriti*, non docentis ſed optantis †."

* De Nat. Deor. lib. i. cap. 13.

† Ibid. [illegible] cap. 3.

That the rough and ſmooth, and hooked and crooked, atoms of Democritus, were indeed dreams and dotages, is a poſition which no man will controvert; but ſurely Strato was himſelf as great a dreamer when he made ſenſation and intelligence reſult from a certain plaſtic or ſpermatic life in matter, which is itſelf devoid of ſenſe and conſciouſneſs. It is, indeed, inconceivable, to uſe the emphatic language of Cudworth, "how any one in his ſenſes ſhould admit ſuch a monſtrous paradox as this, that every atom of duſt has in itſelf as much wiſdom as the greateſt politician and moſt profound philoſopher, and yet is neither conſcious nor intelligent!" It is to be obſerved of Strato likewiſe, that though he attributed a certain kind of life to matter, he by no means allowed of one common life ruling over the whole material univerſe. He ſuppoſed the ſeveral parts of matter to have ſo many ſeveral plaſtic lives of their own, and ſeems to have attributed ſomething to chance in the production and preſervation of the mundane ſyſtem.

‡ Cud. Int. Syſt. ed. Moſheim, lib. i cap. 3.

In denying the exiſtence of a God, perpetually directing his plaſtic principle, and in ſuppoſing as many of theſe principles as there are atoms of matter, Strato deviated far from the doctrine of Ariſtotle. The great founder of the peripatetic ſchool, as well as his apoſtate diſciple, taught that natural things are not effected by fortuitous mechaniſm, but by ſuch a *nature* as acts regularly and artificially for *ends*; yet he never conſiders this *nature* as the higheſt principle, or ſupreme *Numen*, but as ſubordinate to a perfect mind or intellect; and he expreſsly affirms, that "*mind*, together with *nature*, formed the univerſe." He evidently conſiders mind as the principal and intelligent agent, and nature as the ſubſervient and executive inſtrument. Indeed, we are ſtrongly inclined to adopt the opinion of the learned Moſheim, who thinks that by nature Ariſtotle meant nothing more than that θερμοτης ψυχικη, or *animal heat*, to which he attributes ſo much, and which he expreſsly ſays is found in all ſeed. Be this as it may, he always joins God and nature together, and affirms that they do nothing in vain. The ſame doctrine was taught alſo by Plato, who affirms that "nature, together with reaſon, and according to it, orders all things." It muſt not, however, be concealed, that Plato ſeems to have attributed intelligence to the principle by which he ſuppoſed the world to be animated: for Chalcidius, commenting on the Timæus ‖, thus ſpeaks of his doctrine: "Hæc [illegible] ſenſibilis anima mundi, quæ [illegible] vegetatione tutelam [illegible] tionibus obſequens, providentiam nativis impertiens, æternorum ſimilitudine propter cognationem beata."—Apuleius too, tells us §, "illam [illegible] animam [illegible] ſubſervientem [illegible] immortalem eſſe." *Plato* [illegible]

§ De Generat. Animal. lib. ii. cap. 11.

‖ In Tim. p.

§ De Dogmate Platonis.

The doctrine of Plato has been adopted by many moderns of great eminence both for genius and for learning. The celebrated Biſhop of Cloyne, after giving the view of Plato's *ſyſtem* which the reader will find in our article MOTION, N° 10, thus recommends the ſtudy of his philoſophy *: "If Plato's philoſophy itſelf was not read only, but ſtudied with care, and made his own interpreter, I believe the prejudice that now lies againſt him would ſoon wear off, or be even converted into high eſteem, for thoſe exalted notions, and fine hints, that ſparkle and ſhine throughout his writings; which ſeem to contain not only the moſt valuable learning of Athens and Greece, but alſo a treaſury of the moſt remote traditions and early ſcience of the eaſt." Cudworth, and the learned author of *Ancient Metaphyſics*, are likewiſe ſtrenuous advocates for the Ariſtotelian doctrine of a plaſtic nature diffuſed through the material world; (ſee METAPHYSICS, N° 200, 201, 202.) and a notion very ſimilar has lately

* Siris, N° 332.

occurred to a writer who does not appear to have borrowed it either from the *Lyceum* or the *Academy*.

This writer is Mr Young, of whoſe *active ſubſtance*, and its agency in moving bodies, ſome account has been given elſewhere, (ſee MOTION). As a mere unconſcious agent, *immaterial*, and, as he expreſſes himſelf, *immental*, it bears a ſtriking reſemblance to the *plaſtic nature* or *vegetable life* of Cudworth: but the author holds it to be not only the principle of motion, but alſo the *baſis* or *ſubſtratum* of matter itſelf; in the production of which, by certain motions, it may be ſaid to be more ſtrictly *plaſtic* than the *hylarchical* principle, or *vis genitrix*, of any other philoſopher with whoſe writings we have any acquaintance. Though this opinion be ſingular, yet as its author is evidently a man who thinks for himſelf, unawed by the authority of celebrated names, and as one great part of the utility of ſuch works as ours conſiſts in their ſerving as indexes to ſcience and literature, we ſhall lay before our readers a ſhort abſtract of the reaſonings by which Mr Young endeavours to ſupport his hypotheſis, and we ſhall take the liberty of remarking upon thoſe reaſonings as we proceed.

The author, after a ſhort introduction, enters upon his work ‡, in a chapter intitled, *Analyſis of Matter in general*. In that chapter there is little novelty. He treats, as others have done, of primary and ſecondary qualities, and adheres too cloſely to the language of Locke, when he ſays, that "the nature of bodies ſignifies the aggregate of all thoſe *ideas* with which they furniſh us, and by which they are made known." To ſay the beſt of it, this ſentence is inaccurately expreſſed. An aggregate of *ideas* may be occaſioned by the impulſe of bodies on the organs of ſenſe, but the effect of impulſe cannot be that which impels. We ſhould not have made this remark, which may perhaps be deemed captious, were we not perſuaded that the vague and inaccurate uſe of terms is the ſource of thoſe miſtakes into which, we cannot help thinking, that the very ingenious author has ſometimes fallen. Having juſtly obſerved, that we know nothing directly of bodies but their qualities, he proceeds to inveſtigate the nature of ſolidity.

‡ *An Eſſay on the powers and mechaniſm of nature.*

"Solidity (he ſays) is the quality of body which principally requires our notice. It is that which fills extenſion, and which reſiſts other ſolids, occupying the place which it occupies; thus making extenſion and figure real, and different from mere ſpace and vacuity. If the ſecondary qualities of bodies, or their powers variouſly to affect our ſenſes, depend on their primary qualities, it is chiefly on this of ſolidity; which is therefore the moſt important of the primary qualities, and that in which the eſſence of body is by ſome conceived to conſiſt. This idea of ſolidity has been judged to be incapable of any analyſis; but it appears evident to me (continues our author), that the idea of ſolidity may be reſolved into another idea, which is that of the power of reſiſting within the extenſion of body. Hence it becomes unneceſſary, and even inadmiſſible, to ſuppoſe that ſolidity in the body is at all a pattern or archetype of our ſenſation."

That ſolidity in the body, and we know nothing of ſolidity any where elſe, is no pattern of any ſenſation of ours, is indeed moſt true, as we have ſhown at large in another place, (ſee METAPHYSICS, N° 44 and 171): but to reconcile this with what our author aſſerts immediately afterwards, that "ſolidity is no more in bodies than colours and flavours are, and that it is equally with them a *ſenſation* and an *idea*," would be a taſk to which our ingenuity is by no means equal. He affirms, indeed, that ſolidity, as it is ſaid to be in bodies, is utterly incomprehenſible; that we can perfectly comprehend it as a ſenſation in ourſelves, but that in bodies nothing more is required than a power of active reſiſtance to make upon our ſenſes thoſe impreſſions from which we infer the reality of primary and ſecondary qualities. This power of reſiſtance, whether it ought to be called active or paſſive, we apprehend to be that which all other philoſophers have meant by the word *ſolidity*; and though Locke, who uſes the words *idea* and *notion* indiſcriminately, often talks of the *idea* of ſolidity, we believe our author to be the firſt of human beings who has thought of treating *ſolidity* as a ſenſation in the mind.

Though it is wrong to innovate in language, when writing on ſubjects which require much attention, we muſt, however, acknowledge it to be unworthy of inquirers after truth to diſpute about the proper or improper uſe of terms, ſo long as the meaning of him who employs them can be eaſily diſcovered. We ſhall, therefore, follow our author in his endeavours to aſcertain what this power of reſiſtance is which is commonly known by the name of ſolidity. All power he juſtly holds to be active; and having, by an argument (A) of which

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" (A) We can only conceive of ſolidity as being a reſiſtance of the *parts* of any body, to a power which endeavours to *ſeparate* them, or to bring them *nearer* together. Now that which reſiſts any power, and prevents its effect, is alſo a power. By reſiſtance, I mean here an active reſiſtance, ſuch as an animal can employ againſt an animal. If a horſe pulls againſt a load, he draws it along; but if he draws againſt another horſe, he is put to a ſtand, and his endeavour is defeated. When any endeavour to change the ſituation of the parts of any ſolid is in like manner prevented from taking effect, and the parts retain their ſituation, the ſituation has plainly been preſerved by an active reſiſtance or power, equivalent to that which was fruitleſsly exerted on them."

Such is our author's reaſoning to prove that matter is eſſentially active, and that from this activity reſults our notion of its ſolidity: but does he not here confound ſolidity with hardneſs, and impenetrability with coheſion? He certainly does; for *water* is as *ſolid*, in the proper ſenſe of the word, as *adamant*, and the particles of *air* as the particles of *iron*. The parts of water are, indeed, ſeparated with eaſe, and thoſe of adamant with difficulty; but it is not becauſe the latter have more ſolidity than the former, but becauſe the power of coheſion, whatever it may be, operates upon them with greater force. Solidity is an attribute of a whole: hardneſs and ſoftneſs reſult from the coheſion of parts. We do not at all perceive the propriety of the ſimile of the horſe pulling a load, and afterwards pulling againſt another horſe. Is it becauſe both horſes are *active* that one of them cannot prevail againſt the other, and becauſe the load is *inactive* that either of them may drag along a maſs of iron of half a ton weight?

which we do not perceive the force, attempted to prove that it is by an inward *power*, and not by its *inertia*, that one body prevents another from occupying the ſame place with itſelf, he naturally enough infers matter to be eſſentially active. "But the activity of matter is to be conſidered in a certain limited ſenſe, and its inertneſs is to be regarded in another limited ſenſe; ſo that theſe are compatible within their reſpective limits. The activity of body may be conſidered as belonging to the parts of a compound; its inertia as the inertia formed of thoſe parts. The actions of the parts are everywhere oppoſed to each other, and equal; and hence reſults the inactivity of the whole."

SOLIDITY alone of the primary qualities being poſitive, and peculiar to bodies, and our author having reſolved this into ACTION or POWER, it follows, by his analyſis, that the ESSENCE OF BODY is reduced to power likewiſe. But, as he properly obſerves, power is an idea of reflection, not acquired by the ſenſes, but ſuggeſted by thought. Hence our knowledge of real exiſtence in body muſt be ſuch as is ſuggeſted to us by our thoughts exerciſed about our ſenſations. "We are capable of acting and producing changes in appearances; and this faculty, which we experience to exiſt in ourſelves, we call power. We are conſcious of the exertion of our own power; and therefore, when we ſee ACTION or CHANGE happen without any exertion of ours, we refer this to other powers without us, and neceſſarily conclude the POWER to exiſt where the change begins or the action is exerted. This power, then, referred to bodies, muſt exiſt in them, or it can exiſt no where."

In two chapters, which might eaſily have been compreſſed into one not ſo long as the ſhorteſt of them, our author analyzes *atoms* or the primary particles of matter, and ſtrenuouſly oppoſes their impenetrability. He allows that there are atoms of matter not diviſible by any known force; but as theſe, however ſmall, muſt ſtill be conceived as having extenſion, each of them muſt be compoſed of parts held together by the ſame power which binds together many atoms in the ſame body. This power, indeed, he acknowledges to operate much more forcibly when it cements the parts of a primary atom than when it makes many atoms cohere in one maſs; but ſtill it operates in the ſame manner: and as the ideal analyſis may be carried on *ad infinitum*, the only poſitive idea which is ſuggeſted by atoms, or the parts of atoms, is the idea of a reſiſting power. That this power of reſiſtance, which conſtitutes what is vulgarly called the ſolidity of bodies, may not be abſolutely impenetrable, he attempts to prove, by ſhowing that reſiſtance does in fact take place in caſes where impenetrability, and even ſolidity, are not ſuppoſed by any man.

"Let us endeavour (ſays he) to bring together two like poles of a magnet, and we ſhall experience a reſiſtance to their approximation. Why, then, may not a piece of iron, which between our fingers reſiſts their coming together, reſiſt by an efficacy perfectly ſimilar, though more ſtrongly exerted? If magnetiſm were to act upon our bodies as upon iron, we ſhould feel it; or were magnets endowed with ſenſation, they would feel that which reſiſts their nearer approach. The reſiſting extenſion between the two magnets is permeable to all the rays of light, and reflecting none is therefore unſeen; but it is eaſy to conceive that the ſame power which reſiſts the approach of the iron might reſiſt and reflect ſome rays of light. We ſhould then have a viſible object interpoſed between the two magnets, as we have before ſuppoſed it might be a tangible one. It is likewiſe eaſy to conceive that which is tangible and viſible ſo applied to our organs of taſting, of ſmelling, and of hearing, as to excite ideas of flavours, odours, and ſounds. Thus we ſee that an action, in which no ſuppoſition of ſolidity or impenetrability is involved, may be conceived to aſſume all the qualities of matter, by only ſuppoſing a familiar effect extended in its operation."

This reaſoning is exceedingly ingenious, though perhaps not original; but what is of more importance, it does not approach ſo near to demonſtration as the author ſeems to imagine. If magnets operate by means of a fluid iſſuing from them (ſee MAGNETISM), thoſe who hold the ſolidity or impenetrability of matter will maintain, that each atom of the magnetic fluid is ſolid and impenetrable. That we do not ſee nor feel theſe atoms, will be conſidered as no argument that they do not exiſt; for we do not ſee, nor in a cloſe room feel, the atoms of the ſurrounding atmoſphere; which yet Mr Young will acknowledge to have a real exiſtence, and to be capable of operating upon our ſenſes of hearing and ſmelling. Let us, however, ſuppoſe, that by this reaſoning he has eſtabliſhed the non-exiſtence of every thing in the primary atoms of matter but active powers of reſiſtance, and let us ſee how he conceives the actions of theſe powers to conſtitute what gives us the notion of inert and ſolid body; for that we have ſuch a notion cannot be denied.

To ACT he allows to be an attribute, and juſtly obſerves, that we cannot conceive an attribute to exiſt without a ſubſtance. "But (ſays he) we have traced all phenomena to action as to a generic idea, comprehending under it all forms of matter and motion as ſpecies of that genus. By this analyſis, that complex idea we have uſually denominated matter, and conſidered as the ſubſtance or ſubſtratum to which motion appertained as an attribute, is found to change its character, and to be itſelf an attribute of a ſubſtance eſſentially active, of which one modification of motion produces matter and another generates motion." The action of this ſubſtance Mr Young determines to be motion, (ſee MOTION, N° 16.); and he proceeds to inquire by what kind of motion it produces matter, or inert and reſiſting atoms.

"Whatever portion of the ACTIVE SUBSTANCE is given to form an atom, the following things are neceſſary to be united in ſuch portion of active ſubſtance: *1ſt*, It muſt in ſome reſpect continually move; for otherwiſe it would loſe its nature, and ceaſe to be active. *2dly*, It muſt alſo in ſome other reſpect be at reſt, for otherwiſe it could not form an inactive atom. *3dly*, It muſt preſerve unity within itſelf." The author's proof

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If ſo, double or triple the maſs, and a very ſtrange phenomenon will be the reſult; for we ſhall have an active whole compounded of two or three inactive parts, even though thoſe parts ſhould not be in contact!

proof of the firſt of theſe poſitions we have given elſewhere. The ſecond he holds to be ſelf-evident; and the third he thinks eſtabliſhed by the following reaſoning: "Solidity is the reſult of thoſe actions among the parts of any whole, whereby the unity of the whole is preſerved within itſelf. Several uncohering things may be united by an external bond: this does not conſtitute theſe one ſolid; it may be one bundle: but if ſeveral things cohere, and have a unity preſerved within themſelves, they become one ſolid. An atom is the leaſt and moſt ſimple ſolid."

Having thus proved the neceſſity of theſe three requiſites to the formation of an atom, he obſerves, that "the two firſt can only be united in a rotation of the portion of active ſubſtance about a centre or axis at reſt. By ſuch a motion, *all the parts* ſucceſſively occupy *different places* in the orbit of rotation, and therefore move; the centre round which they revolve being at reſt, the *whole portion* is alſo at reſt; and thus the portion is at once moving and quieſcent, as is required. The ſame kind of motion will alſo fulfil the terms of the third requiſite; for a ſubſtance having a revolving motion around its own centre, preſerves its unity by reaſon of all the parts preſerving the ſame relation to the centre: and further, a motion of the active ſubſtance about a centre or axis will be an activity in the ſame orbit, which will act upon and reſiſt whatever ſhall interfere to oppoſe its activity, or deſtroy the unity of the ſphere, by diverting the courſe of the revolving motions. The activity or motion of a portion of ACTIVE SUBSTANCE about a centre will, therefore, give ſolidity to ſuch portion; for it will give it unity and reſiſtance, and in a manner tie together all the parts, forming them into one maſs about their common centre: for they move or are active not *towards* the centre, in which caſe they would be loſt in non-extenſion; nor *from* the centre, where they would diſſipate in boundleſs ſpace; but *about* the centre, preſerving the ſame limits of extenſion: and being in this way active, they in this way reſiſt any other activity oppoſed to them, that is, they reſiſt any action which tends to penetrate or divide this ſphere of revolving activity. Therefore, ſince any portion of active ſubſtance does, by revolving about a centre, become an united, reſiſting, and quieſcent whole, the ſmalleſt portions of the ACTIVE SUBSTANCE which have ſuch motions will become *atoms*, or make the ſmalleſt portions of matter."

Having thus ſhown to his own ſatisfaction how atoms of matter are formed, he next explains what at firſt he confeſſes may have appeared a paradox, "how the ACTIVE SUBSTANCE, retaining its own nature and eſſential properties, continuing immaterial, unſolid, and active, puts on at the ſame time the form of matter, and becomes material, ſolid, and inert. A ſphere of revolving active ſubſtance, as it revolves continually about a centre, and as parts of the ſubſtance, are conſidered as ſucceſſively paſſing through every point in the orbit; conſidered thus in its parts, and in its motions, it is ACTIVE SUBSTANCE, immaterial, and unſolid; but the whole ſphere, conſidered unitically, collectively, and as quieſcent, is in this point of view a ſolid atom, material, and inert."

Such is the active ſubſtance of Mr Young, and ſuch his theory of the formation of matter. That he has not with ſervility copied from the ancients, every reader of his book, who is not an abſolute ſtranger to Greek and Roman literature, will readily acknowledge; and yet if his theory be well founded, he has diſcovered a middle ſubſtance between mind and matter, more properly *plaſtic* than Ariſtotle or Plato, Cudworth or Berkeley, ever conceived. But truth compels us to add, that to us his theory appears to labour under inſuperable objections. That there *may* be in the univerſe a ſubſtance eſſentially active, and at the ſame time not intelligent, is a propoſition which we are by no means inclined to controvert. Various phenomena, both in vegetable and animal life, lead us to ſuſpect that there is ſuch a ſubſtance; but it does not follow that we are inclined to adopt our author's doctrine reſpecting the formation of matter. He conceives his proof, indeed, to be "in its nature not at all imperfect, or to fall ſhort of demonſtration; and if any one refuſe it, he thinks it will be neceſſary for him to ſhow, either that the explanation offered is not ſufficient, or that ſome other explanation will ſerve equally well."

To ſhow that the explanation offered is not ſufficient, will not, we apprehend, be a very arduous taſk; but we have no inclination to attempt ourſelves another explanation, becauſe we believe that of the formation of matter no other account can be given than that which reſolves it into the *fiat* of the Creator. That it cannot be formed by the motion of an immaterial ſubſtance in the manner which our author has very clearly deſcribed, ſeems to be a truth ſo evident as not to admit of proof; for if motion be, as he defines it, a change of place, every thing that is moved muſt have the quality of extenſion. But all the parts of this active ſubſtance which are given to form an atom, move round a centre, and are expreſsly ſaid to occupy ſucceſſively different *places* in the orbit of rotation. Every one of theſe parts, therefore, is an extended being: and ſince, according to our author, ſolidity is nothing but an *active power of reſiſtance*, and the parts of this active ſubſtance, in their rotation round their centre, *act upon* and *reſiſt* whatever interferes to oppoſe their activity, it follows that each of theſe parts is likewiſe a *ſolid being*. But, in the opinion of Mr Young himſelf, and of all mankind, whatever is extended and ſolid is material. This theory, therefore, exhibits a proceſs in which atoms are formed of a ſubſtance, which, though it is ſaid to be *active*, *immaterial*, and unſolid, appears, when narrowly inſpected, to be nothing elſe than a collection of thoſe very atoms of which the author pretends to explain the formation. Mr Young, who examines and very freely cenſures ſome of the doctrines of Newton and others, is too much a man of ſcience to be offended at us for ſtating objections to a theory which is quite new, to a transformation which he himſelf acknowledges may to many "appear not only problematical and difficult to conceive, but wholly impoſſible, and implying contradictions abſolutely and for ever irreconcileable." Whether this be a juſt character of it our readers muſt determine; but if we did not believe the author to be a man of ingenuity, we ſhould not have introduced him or his work to their acquaintance.

PLASTIC Art, the art of repreſenting all ſorts of figures by the means of moulds. This term is derived from the Greek word πλαϛικη, which ſignifies the "art of forming, modelling, or caſting, in a mould." A mould in general is a body that is made hollow for that purpoſe. The artiſt makes uſe of it to form figures in

Plaſtic.

bronze, lead, gold, ſilver, or any other metal or fuſible ſubſtance. The mould is made of clay, ſtucco, or other compoſition, and is hollowed into the form of the figure that is to be produced; they then apply the jet, which is a ſort of funnel, through which the metal is poured that is to form the figures, and that is called *running the metal into the mould.*

It is in this manner, but with much practice and attention, that the artiſt forms, 1. Equeſtrian and pedeſtrian ſtatues of every kind; 2. Groups; 3. Pedeſtals; 4. Bas reliefs; 5. Medallions; 6. Cannons, mortars, and other pieces of artillery; 7. Ornaments of architecture, as capitals, baſes, &c.; 8. Various ſorts of furniture, as luſtres, branches, &c. in every kind of metal: and in the ſame manner figures are caſt in ſtucco, plaſter, or any other ſmooth matter. See *PLASTER of Paris.*

Wax being a ſubſtance that is very eaſily put in fuſion, plaſtics make much uſe of it. There are impreſſions which are highly pleaſing in coloured wax, of medallions, baſſo and alto relievos, and of detached figures; which, however, are ſomewhat brittle. But this matter has been carried too far: they have not only formed moulds to repreſent the likeneſs and the buſt of a living perſon, by applying the plaſter to the face itſelf, and afterwards caſting melted wax into the mould; but they have alſo painted that waxen buſt with the natural colours of the face, and have then applied glaſs eyes and natural hair; to which they have joined a ſtuffed body and limbs, with hands of wax; and have, laſtly, dreſſed their figure in a real habit; and by theſe means have produced an object the moſt ſhocking and deteſtable that it is poſſible to conceive. It is not a ſtatue, a buſt, a natural reſemblance that they form; but a dead body, a lifeleſs countenance, a mere carcaſe. The ſtiff air, the inflexible muſcles, the haggard eyes of glaſs, all contribute to produce an object that is hideous and diſguſtful to every man of taſte. Figures like theſe offend by affording too exact an imitation of nature. In no one of the polite arts ought imitation ever to approach ſo near the truth as to be taken for nature herſelf. Illuſion muſt have its bounds; without which it becomes ridiculous.

There is another invention far more ingenious and pleaſing, which is that wherein M. Lippart, antiquary and artiſt at Dreſden, has ſo much excelled. He has found the means of reſembling, by indefatigable labour, great expence, and infinite taſte, that immenſe nnmber of ſtones, engraved and in camaieu, which are to be ſeen in the moſt celebrated cabinets. He has made choice of thoſe that are the moſt beautiful; and, with a paſte of his own invention, he takes from theſe ſtones an impreſſion that is ſurpriſingly accurate, and which afterwards become as marble: theſe impreſſions he calls *paſti.* He then gives them a proper colour, and incloſes each with a gold rim; and, by ranging them in a judicious order, forms of them an admirable ſyſtem. They are fixed on ſhelf-boards, which form ſo many drawers, and are then incloſed in caſes, which repreſent folio volumes, and have titles wrote on their backs; ſo that theſe fictitious books may conveniently occupy a place in a library. Nothing can be more ingenious than this invention; and, by means of it, perſons of moderate fortune are enabled to make a complete collection of all antiquity has left that is excellent of this kind; and the copies are very little inferior to the originals.

Plaſtic, Plata.

There is alſo another method of taking the impreſſions of camaieus, medals, and coins, which is as follows: They waſh or properly clean the piece whoſe impreſſion is to be taken, and ſurround it with a border of wax. They then diſſolve iſinglaſs in water, and make a decoction of it, mixing with it ſome vermilion, to give it an agreeable red colour. They pour this paſte, when hot, on the ſtone or medal, to the thickneſs of about the tenth part of an inch; they then leave it expoſed to the ſun, in a place free from duſt. After a few days this paſte becomes hard, and offers to the eye the moſt admirable and faithful repreſentation of the medal that it is poſſible to conceive: they are then carefully placed in drawers; and thouſands of theſe impreſſions, which comprehend many ages, may be included in a ſmall compaſs.

The proficients in plaſtics have likewiſe invented the art of caſting in a mould papier maché or diſſolved paper, and forming it into figures in imitation of ſculpture, of ornaments and decorations for ceilings, furniture, &c. and which they afterwards paint or gild. There are, however, ſome inconveniences attending this art; as, for example, the imperfections in the moulds, which render the contours of the figures inelegant, and give them a heavy air: theſe ornaments, moreover, are not ſo durable as thoſe of bronze or wood, ſeeing that in a few years they are preyed on by the worm.

The figures that are given to porcelain, Delft ware, &c. belong alſo to plaſtics: for they are formed by moulds, as well as by the art of the ſculptor and turner; and by all theſe arts united are made vaſes of every kind, figures, groups, and other deſigns, either for uſe or ornament.

From this general article the reader is referred to FOUNDERY, CAST, GLAZING, PORCELAIN, *PAPIER-Maché*, POTTERY, *DELFT Ware.*

PLATA, the name of a very great river of South America, running through the province of Paraguay; whence the whole country is ſometimes called *Plata;* though this name is uſually beſtowed only upon a part of Paraguay. In the latter ſenſe it comprehends all that country bounded on the eaſt and ſouth-eaſt by the Atlantic ocean; on the ſouth, by Terra Magellanica; on the weſt, by Tucuman; and on the north, by the provinces of Paraguay Proper and Parana. The great river La Plata, from which the country has its name, was firſt diſcovered, in 1515, by Juan Diaz de Solis; but denominated *La Plata* by Sebaſtian Gabato, from the great quantity of the precious metals he procured from the adjacent inhabitants, imagining it was the produce of the country, though in fact they brought it from Peru.

The country lies between 32° and 37° of ſouth latitude. The climate is pleaſant and healthy. Their winter is in May, June, and July, when the nights are indeed very cold, but the days moderately warm; the froſt is neither violent nor laſting, and the ſnows are very inconſiderable.

The country conſiſts moſtly of plains of a vaſt extent, and exceeding rich ſoil, producing all ſorts of European and American fruits, wheat, maize, cotton, ſugar, honey, &c. and abounding with ſuch excellent paſtures, that the beaſts brought hither from Spain are multiplied to ſuch a degree, that they are all in common, no man claiming any property in them, but every man takes what he hath occaſion for. The number of black cattle, eſpecially, is ſo prodigious, that many thouſands of them are killed merely for their hides, every time the ſhips go for Spain, and their carcaſes left to be devoured by wild beaſts and birds of prey, which are alſo very numerous. Sometimes, when they cannot vend their hides, they will kill them for their tongues; and thoſe who care not to be at the trouble to fetch them from the plains, may buy them for a trifle. There is a curious account in Lord Anſon's voyage of the manner of hunting them on horſeback; and of catching and killing them, by throwing a nooſe on their horns at full gallop, the horſes being trained to the ſport. Horſes are no leſs numerous, and in common like the other cattle; ſo that a man may have as many as he pleaſes for the catching; and of thoſe that are already broke, one may buy ſome of the beſt, and of the true Spaniſh breed, for a piece-of-eight per head. Wild-fowl alſo is in great plenty here; partridges in particular are more numerous, and as large and tame as our hens, ſo that one may kill them with a ſtick. Their wheat makes the fineſt and whiteſt of bread; and, in a word, they ſeem to want for nothing here, eſpecially the natives, but ſalt and fuel. The former the Spaniards have brought to them from other parts; and the latter they ſupply themſelves with, by planting vaſt numbers of almond, peach, and other trees, which require no other trouble than putting the kernels into the ground, and by the next year, we are told, they begin to bear fruit. The return for European commodities is ſo great here, that it almoſt exceeds belief; an ordinary two-penny knife fetching a crown, and a gun of the value of 10 or 12 ſhillings 20 or 30 crowns, and ſo of the reſt.

The river Plata riſes in Peru, and receives a great many others in its courſe; the chief of which is the Paraguay. The water of it is ſaid to be very clear and ſweet, and to petrify wood; and contains ſuch plenty and variety of fiſh, that the people catch great quantities of them without any other inſtrument than their hands. It runs moſtly to the ſouth and ſouth-eaſt; and is navigable the greater part of its courſe by the largeſt veſſels, and full of delightful iſlands. All along its banks are ſeen the moſt beautiful birds of all kinds; but it ſometimes overflows the adjacent country to a great extent, and is infeſted by ſerpents of a prodigious bigneſs. From its junction with the Paraguay to its mouth it is above 200 leagues. We may form ſome judgement of its largeneſs by the width of its mouth, which is ſaid to be about 70 leagues. Before it falls into the Paraguay it is called *Panama*. See PANAMA.

PLATÆÆ, in *Ancient Geography*, a very ſtrong town of Bœotia, in its ſituation expoſed to the north wind (Theophraſtus); burnt to the ground by Xerxes (Herodotus, Juſtinus); mentioned much in the courſe of the Perſian war: Famous for the defeat of Mardonius, the Perſian general; and for the moſt ſignal victory of the Lacedemonians and other Greeks under Pauſanias the Lacedemonian, and Ariſtides an Athenian general (Nepos, Diodorus, Plutarch); in memory of which the Greeks erected a temple to Jupiter Eleutherius, and inſtituted games which they called *Eleutheria;* and there they ſhow the tombs of thoſe who fell in that battle (Strabo). It ſtood at the foot of Mount Cithæron, between that and Thebes to the north, on the road to Athens and Megara, and on the confines of Attica and Megaris. Now in ruins.

PLATALLA, the SPOONBILL, a genus of birds belonging to the order of grallæ. See ORNITHOLOGY *Index*.

PLATANUS, the PLANE-TREE; a genus of plants belonging to the monœcia claſs. See BOTANY *Index*.

PLATBAND, in *Gardening*, a border or bed of flowers, along a wall, or the ſide of a parterre, frequently edged with box, &c.

PLATBAND of a door or window, is uſed for the lintel, where that is made ſquare, or not much marked.

PLATE, a term which denotes a piece of wrought ſilver, ſuch as the ſhallow veſſel off which meat is eaten. It is likewiſe uſed by ſportſmen to expreſs the reward given to the beſt horſe at our races.

Sportſman's Dictionary.

The winning a plate is not the work of a few days to the owner of the horſe; but great care and preparation is to be made for it, if there is any great dependence on the ſucceſs. A month is the leaſt time that can be allowed to draw the horſe's body clear, and to refine his wind to that degree of perfection that is attainable by art.

It is firſt neceſſary to take an exact view of his body, whether he be low or high in fleſh; and it is alſo neceſſary to conſider whether he be dull and heavy, or briſk and lively when abroad. If he appear dull and heavy, and there is reaſon to ſuppoſe it is owing to too hard riding, or, as the jockeys expreſs it, to ſome greaſe that has been diſſolved in hunting, and has not been removed by ſcouring, then the proper remedy is half an ounce of diapente given in a pint of good ſack; this will at once remove the cauſe, and revive the creature's ſpirits. After this, for the firſt week of the month, he is to be fed with oats, bread, and ſplit beans; giving him ſometimes the one and ſometimes the other as he likes beſt; and always leaving ſome in the locker, that he may feed at leiſure when he is left alone. When the groom returns at the feeding time, whatever is left of this muſt be removed, and freſh given; by this means the creature will ſoon become high-ſpirited, wanton, and full of play. Every day he muſt be rode out an airing, and every other day it will be proper to give him a little more exerciſe; but not ſo much as to make him ſweat too much. The beans and oats in this caſe are to be put into a bag, and beaten till the hulls are all off, and then winnowed clean; and the bread, inſtead of being chipped in the common way, is to have the cruſt clean cut off. If the horſe be in good fleſh and ſpirits when taken up for its month's preparation, the diapente muſt be omitted; and the chief buſineſs will be to give him good food, and ſo much exerciſe as will keep him in wind, without overſweating him or tiring his ſpirits. When he takes larger exerciſes afterwards, towards the end of the month, it will be proper to have ſome horſes in the place to run againſt him. This will put him upon his mettle, and the beating them will give him ſpirits. This, however, is to be cautiouſly obſerved, that he has not a bloody heat given him for ten days or a fortnight before the plate is to be run for; and that the laſt heat that is given him the day before the race, muſt be in his clothes: this will make him run with greatly more vigour, when ſtripped for the race, and feeling the cold wind on every part.

In the ſecond week, the horſe ſhould have the ſame food, and more exerciſe. In the laſt fortnight, he muſt have dried oats, that have been hulled by beating. After this they are to be wetted in a quantity of whites of eggs beaten up, and then laid out in the ſun to dry; and when as dry as before, the horſe is to have them. This ſort of food is very light of digeſtion, and very good for the creature's wind. The beans in this time ſhould be given more ſparingly, and the bread ſhould be made of three parts wheat and one part beans. If he ſhould become coſtive under this courſe, he muſt then have ſome ale and whites of eggs beaten together; this will cool him, and keep his body moiſt.

In the laſt week the oats are to be omitted, and barley-water given him in its place, every day, till the day before the race: he ſhould have his fill of hay; then he muſt have it given him more ſparingly, that he may have time to digeſt it: and in the morning of the race day he muſt have a toaſt or two of white bread ſoaked in ſack, and the ſame juſt before he is let out to the field. This is an excellent method, becauſe the two extremes of fulneſs and faſting are at this time to be equally avoided: the one hurting his wind, and the other occaſioning faintneſs that may make him loſe. After he has had his food, the litter is to be ſhook up, and the ſtable kept quiet, that he may be diſturbed by nothing till he is taken out to run.

PLATFORM, in the military art, an elevation of earth, on which cannon is placed to fire on the enemy; ſuch are the mounts in the middle of curtins. On the ramparts there is always a platform, where the cannon are mounted. It is made by the heaping up of earth on the rampart, or by an arrangement of madriers, riſing inſenſibly, for the cannon to roll on, either in a caſemate or on attack in the outworks. All practitioners are agreed, that no ſhot can be depended on, unleſs the piece can be placed on a ſolid platform; for if the platform ſhakes with the firſt impulſe of the powder, the piece muſt likewiſe ſhake, which will alter its direction, and render the ſhot uncertain.

PLATFORM, in *Architecture*, is a row of beams which ſupport the timber-work of a roof, and lie on the top of a wall where the entablature ought to be raiſed.

This term is alſo uſed for a kind of terrace or broad ſmooth open walk at the top of a building, from whence a fair proſpect may be taken of the adjacent country. Hence an edifice is ſaid to be covered with a platform, when it is flat at top, and has no ridge. Moſt of the oriental buildings are thus covered, as were all thoſe of the ancients.

PLATFORM, or *Orlop*, in a man of war, a place on the lower deck, abaft the main-maſt, between it and the cockpit, and round about the main capſtan, where proviſion is made for the wounded men in time of action.

PLATINA is a metallic ſubſtance, the name of which has an alluſion to its colour. It is a diminutive of *plata*, and ſignifies "little ſilver." From its great ſpecific gravity, and other reſemblances which it has to gold, it has been called *or blanc*, or *white gold*; from its refractory nature, *diabolus metallorum*; from ſome doubts entertained of its character as a metal, *juan blanco*, *white jack*, *white negro*, or *white mock metal*. It has alſo received the appellation of the *eighth metal*: and probably from ſome diſtrict which affords it, has gotten the name of *platina del Pinto*. For an account of its properties, and for its natural hiſtory, ſee CHEMISTRY; MINERALOGY; and ORES, *Reduction of*.

PLATING is the art of covering baſer metals with a thin plate of ſilver either for uſe or for ornament. It is ſaid to have been invented by a ſpur-maker, not for ſhow but for real utility. Till then the more elegant ſpurs in common uſe were made of ſolid ſilver, and from the flexibility of that metal they were liable to be bent into inconvenient forms by the ſlighteſt accident. To remedy this defect, a workman at Birmingham contrived to make the branches of a pair of ſpurs hollow, and to fill that hollow with a ſlender rod of ſteel or iron. Finding this a great improvement, and being deſirous to add cheapneſs to utility, he continued to make the hollow larger, and of courſe the iron thicker and thicker, till at laſt he diſcovered the means of coating an iron ſpur with ſilver in ſuch a manner as to make it equally elegant with thoſe which were made wholly of that metal. The invention was quickly applied to other purpoſes; and to numberleſs utenſils which were formerly made of braſs or iron are now given the ſtrength of theſe metals, and the elegance of ſilver, for a ſmall additional expence.

The ſilver plate is generally made to adhere to the baſer metal by means of ſolder; which is of two kinds, the *ſoft* and the *hard*, or the *tin* and *ſilver* ſolders. The former of theſe conſiſts of tin alone, the latter generally of three parts of ſilver and one of braſs. When a buckle, for inſtance, is to be plated by means of the ſoft ſolder, the ring, before it is bent, is firſt tinned, and then the ſilver-plate is gently hammered upon it, the hammer employed being always covered with a piece of cloth. The ſilver now forms, as it were, a mould to the ring, and whatever of it is not intended to be uſed is cut off. This mould is faſtened to the ring of the buckle by two or three cramps of ſmall iron-wire; after which the buckle, with the plated ſide undermoſt, is laid upon a plate of iron ſufficiently hot to melt the tin, but not the ſilver. The buckle is then covered with powdered reſin or anointed with turpentine; and leſt there ſhould be a deficiency of tin, a ſmall portion of rolled tin is likewiſe melted on it. The buckle is now taken off with a tongs, and commonly laid on a bed of ſand, where the plate and the ring, while the ſolder is yet in a ſtate of fuſion, are more cloſely compreſſed by a ſmart ſtroke with a block of wood. The buckle is afterwards bent and finiſhed.

Sometimes the melted tin is poured into the ſilver mould, which has been previouſly rubbed over with ſome reſin. The buckle ring is then put among the melted tin, and the plating finiſhed. This is called by the workmen *filling up*.

When the hard ſolder is employed, the proceſs is in many reſpects different. Before the plate is fitted to the iron or other metal, it is rubbed over with a ſolution of borax. Stripes of ſilver are placed along the joinings of the plate; and inſtead of two or three cramps, as in the former caſe, the whole is wrapped round with ſmall wire: the ſolder and the joinings are again rubbed with the borax, and the whole put into a charcoal fire till the ſolder be in fuſion. When taken out, the wire is inſtantly removed, the plate is cleaned by the application of ſome acid, and afterwards made ſmooth by the ſtrokes of a hammer.

Metal plating is when a bar of ſilver and copper are taken of at leaſt one equal ſide. The equal ſides are made ſmooth, and the two bars faſtened together by wire wrapped round them. Theſe bars are then ſweated in a charcoal fire, and after ſweating, they adhere as cloſely together as if they were ſoldered. After this they are flattened into a plate between two rollers, when the copper appears on one ſide and the ſilver on the other. This ſort of plate is named *plated metal.*

French plating is when ſilver-leaf is burniſhed on a piece of metal in a certain degree of heat.

When ſilver is diſſolved in aquafortis, and precipitated upon another metal, the proceſs is called *ſilvering.* See SOLDERING.

PLATO, an illuſtrious philoſopher of antiquity, was by deſcent an Athenian, though the place of his birth was the iſland of Egina. His lineage through his father is traced back to Codrus the laſt king of Athens, and through his mother to Solon the celebrated legiſlator. The time of his birth is commonly placed in the beginning of the 88th Olympiad; but Dr Enfield thinks it may be more accurately fixed in the third year of the 87th Olympiad, or 430 years before the Chriſtian era. He gave early indications of an extenſive and original genius, and had an education ſuitable to his high rank, being inſtructed in the rudiments of letters by the grammarian Dionyſius, and trained in athletic exerciſes by Ariſto of Argos. He applied with great diligence to the ſtudy of the arts of painting and poetry; and made ſuch proficiency in the latter, as to produce an epic poem, which, upon comparing it with the poems of Homer, he committed to the flames. At the age of 20 he compoſed a dramatic piece; but after he had given it to the performers, happening to attend upon a diſcourſe of Socrates, he was ſo captivated by his eloquence, that he reclaimed his tragedy without ſuffering it to be acted, renounced the muſes, burnt all his poems, and applied himſelf wholly to the ſtudy of wiſdom.

It is thought that Plato's firſt maſters in philoſophy were Cratylus and Hermogenes, who taught the ſyſtems of Heraclitus and Parmenides; but when he was 20 years old, he attached himſelf wholly to Socrates, with whom he remained eight years in the relation of a ſcholar. During this period, he frequently diſpleaſed his companions, and ſometimes even his maſter, by grafting upon the Socratic ſyſtem opinions which were taken from ſome other ſtock. It was the practice of the ſcholars of Socrates to commit to writing the ſubſtance of their maſter's diſcourſes. Plato wrote them in the form of dialogues; but with ſo great additions of his own, that Socrates, hearing him recite his Lyſis, cried out, "O Hercules! how many things does this young man feign of me!"

Plato, however, retained the warmeſt attachment to his maſter. When that great and good man was ſummoned before the ſenate, his illuſtrious ſcholar undertook to plead his cauſe, and begun a ſpeech in his defence; but the partiality and violence of the judges would not permit him to proceed. After the condemnation, he preſented his maſter with money ſufficient to redeem his life; which, however, Socrates refuſed to accept. During his impriſonment, Plato attended him, and was preſent at a converſation which he held with his friends concerning the immortality of the ſoul; the ſubſtance of which he afterwards committed to writing in the beautiful dialogue intitled *Phædo*, not, however, without interweaving his own opinions and language.

The philoſophers who were at Athens were ſo alarmed at the death of Socrates, that moſt of them fled from the city to avoid the injuſtice and cruelty of the government. Plato, whoſe grief upon this occaſion is ſaid by Plutarch to have been exceſſive, retired to Megara; where he was kindly entertained by Euclid, who had been one of Socrates's firſt ſcholars, till the ſtorm was over. Afterwards he determined to travel in purſuit of knowledge; and from Megara he went to Italy, where he conferred with Eurytus, Philolaus, and Archytas. Theſe were the moſt celebrated of the followers of Pythagoras, whoſe doctrine was then become famous in Greece; and from theſe the Pythagoreans have affirmed that he had all his natural philoſophy. He dived into the moſt profound and myſterious ſecrets of the Pythagoric doctrines; and perceiving other knowledge to be connected with them, he went to Cyrene, where he learned geometry of Theodorus the mathematician. From thence he paſſed into Egypt, to acquaint himſelf with the theology of their prieſts, to ſtudy more nicely the proportions of geometry, and to inſtruct himſelf in aſtronomical obſervations; and having taken a full ſurvey of all the country, he ſettled for ſome time in the province of Sais, learning of the wiſe men there, what they held concerning the univerſe, whether it had a beginning, whether it moved wholly or in part, &c.; and Pauſanias affirms, that he learned from theſe the immortality, and alſo the tranſmigration, of ſouls. Some of the fathers will have it, that he had communication with the books of Moſes, and that he ſtudied under a learned Jew of Heliopolis; but there is nothing that can be called evidence for theſe aſſertions. St Auſtin once believed that Plato had ſome conference with Jeremiah; but afterwards diſcovered, that that prophet muſt have been dead at leaſt 60 years before Plato's voyage to Egypt.

Plato's curioſity was not yet ſatisfied. He travelled into Perſia to conſult the magi about the religion of that country: and he deſigned to have penetrated even to the Indies, and to have learned of the Brachmans their manners and cuſtoms; but the wars in Aſia prevented him.

"He then returned into Italy, to the Pythagorean ſchool at Tarentum, where he endeavoured to improve his own ſyſtem, by incorporating with it the doctrine of Pythagoras, as it was then taught by Archytas, Timæus, and others. And afterwards, when he viſited Sicily, he retained ſuch an attachment to the Italic ſchool, that, through the bounty of Dionyſius, he purchaſed at a vaſt price ſeveral books which contained the doctrine of Pythagoras, from Philolaus, one of his followers.

"Returning home richly ſtored with knowledge of various kinds, Plato ſettled in Athens, and executed the deſign, which he had doubtleſs long had in contemplation, of forming a new ſchool for the inſtruction of youth in the principles of philoſophy. The place which he made choice of for this purpoſe was a public grove, called the *Academy*, from Hecademus, who left it to the citizens for the purpoſe of gymnaſtic exerciſes. Adorned with ſtatues, temples, and ſepulchres, planted with lofty plane-trees, and interſected by a gentle ſtream, it afforded a delightful retreat for philoſophy and the muſes. Of this retreat Horace ſpeaks:

Atque inter ſylvas Academi quærere verum.

"'Midſt Academic groves to ſearch for truth."

Within this incloſure he poſſeſſed, as a part of his humble patrimony, purchaſed at the price of three thouſand drachmas, a ſmall garden, in which he opened a ſchool for the reception of thoſe who might be inclined to attend his inſtructions. How much Plato valued mathematical ſtudies, and how neceſſary a preparation he thought them for higher ſpeculations, appears from the inſcription which he placed over the door of his ſchool: 'Ουδεις αγεωμετρητος εισιτω. "Let no one who is unacquainted with geometry enter here."

"This new ſchool ſoon became famous, and its maſter was ranked among the moſt eminent philoſophers. His travels into diſtant countries, where learning and wiſdom flouriſhed, gave him celebrity among his brethren of the Socratic ſect. None of theſe had ventured to inſtitute a ſchool in Athens except Ariſtippus; and he had confined his inſtructions almoſt entirely to ethical ſubjects, and had brought himſelf into ſome diſcredit by the freedom of his manners. Plato alone remained to inherit the patrimony of public eſteem which Socrates had left his diſciples; and he poſſeſſed talents and learning adequate to his deſign of extending the ſtudy of philoſophy beyond the limits within which it had been incloſed by his maſter. The conſequence was, not only that young men crowded to his ſchool from every quarter, but that people of the firſt diſtinction in every department frequented the academy. Even females, diſguiſed in men's clothes, often attended his lectures. Among the illuſtrious names which appear in the catalogue of his followers are Dion the Syracuſan prince, and the orators Hyperides, Lycurgus, Demoſthenes, and Iſocrates.

"Greatneſs was never yet exempted from envy. The diſtinguiſhed reputation of Plato brought upon him the hatred of his former companions in the ſchool of Socrates, and they loaded him with detraction and obloquy. It can only be aſcribed to mutual jealouſy, that Xenophon and he, though they relate the diſcourſes of their common maſter, ſtudiouſly avoid mentioning one another. Diogenes the Cynic ridiculed Plato's doctrine of ideas and other abſtract ſpeculations. In the midſt of theſe private cenſures, however, the public fame of Plato daily increaſed; and ſeveral ſtates, among which were the Arcadians and Thebans, ſent ambaſſadors with earneſt requeſts that he would come over, not only to inſtruct the young men in philoſophy, but alſo to preſcribe them laws of government. The Cyrenians, Syracuſians, Cretans, and Eleans, ſent alſo to him: he did not go to any of them, but gave laws and rules of governing to all. He lived ſingle, yet ſoberly and chaſtely. He was a man of great virtues, and exceedingly affable; of which we need no greater proof, than his civil manner of converſing with the philoſophers of his own times, when pride and envy were at their height. His behaviour to Diogenes is always mentioned in his hiſtory. The Cynic was vaſtly offended, it ſeems, at the politeneſs and fine taſte of Plato, and uſed to catch all opportunities of ſnarling at him. He dined one day at his table with other company, and, trampling upon the tapeſtry with his dirty feet, uttered this brutiſh ſarcaſm, "I trample upon the pride of Plato;" to which Plato wiſely reparteed, "With greater pride."

The fame of Plato drew diſciples to him from all parts; among whom were Speuſippus an Athenian, his ſiſter's ſon, whom he appointed his ſucceſſor in the academy, and the great Ariſtotle.

The admiration of this illuſtrious man was not confined to the breaſts of a few philoſophers. He was in high eſteem with ſeveral princes, particularly Archelaus king of Macedon, and Dionyſius tyrant of Sicily. At three different periods he viſited the court of this latter prince, and made ſeveral bold but unſucceſsful attempts to ſubdue his haughty and tyrannical ſpirit. A brief relation of the particulars of theſe viſits to Sicily may ſerve to caſt ſome light upon the character of our philoſopher; and we ſhall give it in the words of Dr Enfield, from whoſe elegant hiſtory of philoſophy we have extracted by much the moſt valuable parts of this article.

"The profeſſed object of Plato's firſt viſit to Sicily, which happened in the 40th year of his age, during the reign of the elder Dionyſius the ſon of Hermocrates, was, to take a ſurvey of the iſland, and particularly to obſerve the wonders of Mount Ætna. Whilſt he was reſident at Syracuſe, he was employed in the inſtruction of Dion, the king's brother-in-law, who poſſeſſed excellent abilities, though hitherto reſtrained by the terrors of a tyrannical government, and relaxed by the luxuries of a licentious court. Diſguſted by the debauched manners of the Syracuſans, he endeavoured to reſcue his pupil from the general depravity. Nor did Dion diſappoint his preceptor's expectations. No ſooner had he received a taſte of that philoſophy which leads to virtue, than he was fired with an ardent love of wiſdom. Entertaining an hope that philoſophy might produce the ſame effect upon Dionyſius, he took great pains to procure an interview between Plato and the tyrant. In the courſe of the conference, whilſt Plato was diſcourſing on the ſecurity and happineſs of virtue, and the miſeries attending injuſtice and oppreſſion, Dionyſius, perceiving that the philoſopher's diſcourſe was levelled againſt the vices and cruelties of his reign, diſmiſſed him with high diſpleaſure from his preſence, and conceived a deſign againſt his life. It was not without great difficulty that Plato, by the aſſiſtance of Dion, made his eſcape. A veſſel which had brought over Pollis, a delegate from Sparta, was fortunately at that time returning to Greece. Dion engaged Pollis to take the charge of the philoſopher, and land him ſafely in his native country; but Dionyſius diſcovered the deſign, and obtained a promiſe from Pollis, that he would either put him to death or ſell him as a ſlave upon the paſſage. Pollis accordingly ſold him in the iſland of Ægina; the inhabitants of which were then at war with the Athenians. Plato could not long remain unnoticed: Anicerris, a Cyrenaic philoſopher, who happened to be at that time in the iſland, diſcovered the ſtranger, and thought himſelf happy in an opportunity of ſhewing his reſpect for ſo illuſtrious a philoſopher. He purchaſed his freedom for [illegible] minæ, or 8¼l. [illegible] ſterling money, and ſent him home to Athens. Repayment being afterwards offered to Anicerris by Plato's relations, he refuſed the money, ſaying, with that generous ſpirit which true philoſophy always inſpires, that he ſaw no reaſon why the relations of Plato ſhould engroſs to themſelves the honour of ſerving him."

After a ſhort interval, Dionyſius repented of his ill

treat-placed reſentment, and wrote to Plato, earneſtly requeſting him to repair his credit by returning to Syracuſe; to which Plato gave this high-ſpirited anſwer, that philoſophy would not allow him leiſure to think of Dionyſius. He was, however, prevailed upon by his friend Dion to accept of the tyrant's invitation to return to Syracuſe, and take upon him the education of Dionyſius the younger, who was heir apparent to the monarchy. He was received by Dionyſius the reigning ſovereign with every poſſible appearance of reſpect; but after ſeeing his friend baniſhed, and being himſelf kept as a priſoner at large in the palace, he was by the tyrant ſent back into his own country, with a promiſe that both he and Dion ſhould be recalled at the end of the war in which the Sicilians were then engaged. This promiſe was not fulfilled. The tyrant wiſhed for the return of Plato; but could not reſolve to recal Dion. At laſt, however, having probably promiſed that the philoſopher ſhould meet his friend at the court of Syracuſe, he prevailed upon Plato to viſit that capital a third time. When he arrived, the king met him in a magnificent chariot, and conducted him to his palace. The Sicilians too rejoiced in his return; for they hoped that the wiſdom of Plato would at length triumph over the tyrannical ſpirit of the prince. Dionyſius ſeemed wholly diveſted of his former reſentments, liſtened with apparent pleaſure to the philoſopher's doctrine, and, among other expreſſions of regard, preſented him with eighty talents of gold. In the midſt of a numerous train of philoſophers, Plato now poſſeſſed the chief influence and authority in the court of Syracuſe. Whilſt Ariſtippus was enjoying himſelf in ſplendid luxury; whilſt Diogenes was freely indulging his acrimonious humour; and whilſt Æſchines was gratifying his thirſt after riches;—Plato ſupported the credit of philoſophy with an air of dignity, which his friends regarded as an indication of ſuperior wiſdom, but which his enemies imputed to pride. After all, it was not in the power of Plato to prevail upon Dionyſius to adopt his ſyſtem of policy, or to recal Dion from his exile. Mutual diſtruſt, after a ſhort interval, aroſe between the tyrant and the philoſopher; each ſuſpected the other of evil deſigns, and each endeavoured to conceal his ſuſpicion under the diſguiſe of reſpect. Dionyſius attempted to impoſe upon Plato by condeſcending attentions, and Plato to deceive Dionyſius by an appearance of confidence. At length, the philoſopher became ſo much diſſatisfied with his ſituation, that he earneſtly requeſted permiſſion to return to Greece, which was at laſt granted him, and he was ſent home loaded with rich preſents. On his way to Athens, paſſing through Elis during the celebration of the Olympic games, he was preſent at this general aſſembly of the Greeks, and engaged univerſal attention.

From this narrative it appears, that if Plato viſited the courts of princes, it was chiefly from the hope of ſeeing his ideal plan of a republic realized; and that his talents and attainments rather qualified him to ſhine in the academy than in the council or the ſenate.

Plato, now reſtored to his country and his ſchool, devoted himſelf to ſcience, and ſpent the laſt years of a long life in the inſtruction of youth. Having enjoyed the advantage of an athletic conſtitution, and lived all his days temperately, he arrived at the 81ſt, or according to ſome writers the 79th, year of his age, and died, through the mere decay of nature, in the firſt year of the hundred and eighth Olympiad. He paſſed his whole life in a ſtate of celibacy, and therefore left no natural heirs, but transferred his effects by will to his friend Adiamantus. The grove and garden, which had been the ſcene of his philoſophical labours, at laſt afforded him a ſepulchre. Statues and altars were erected to his memory; the day of his birth long continued to be celebrated as a feſtival by his followers; and his portrait is to this day preſerved in gems: but the moſt laſting monuments of his genius are his writings, which have been tranſmitted, without material injury, to the preſent times.

The character of this philoſopher has always been high. Beſides the advantages of a noble birth, he had a large and comprehenſive underſtanding, a vaſt fund of wit and good taſte, great evenneſs and ſweetneſs of temper, all cultivated and refined by education and travel; ſo that it is no wonder if he was honoured by his countrymen, eſteemed by ſtrangers, and adored by his ſcholars. The ancients thought more highly of Plato than of all their philoſophers: they always called him the *Divine Plato;* and they ſeemed reſolved that his deſcent ſhould be more than human. "There are (ſays Apuleius) who aſſert Plato to have ſprung from a more ſublime conception; and that his mother Perictione, who was a very beautiful woman, was impregnated by Apollo in the ſhape of a ſpectre." Plutarch, Suidas, and others, affirm this to have been the common report at Athens. When he was an infant, his father Ariſto went to Hymettus, with his wife and child, to ſacrifice to the muſes; and while they were buſied in the divine rites, a ſwarm of bees came and diſtilled their honey upon his lips. This, ſays Tully, was conſidered as a preſage of his future eloquence. Apuleius relates, that Socrates, the night before Plato was recommended to him, dreamed that a young ſwan fled from Cupid's altar in the academy, and ſettled in his lap; thence ſoared to heaven, and delighted the gods with its muſic: and when Ariſto the next day preſented Plato to him, "Friends (ſays Socrates), this is the ſwan of Cupid's academy." The Greeks loved fables: they ſhow however in the preſent caſe, what exceeding reſpect was paid to the memory of Plato. Tully perfectly adored him; tells us, how he was juſtly called by Panætius the *divine*, the *moſt wiſe*, the *moſt ſacred*, the *Homer of philoſophers;* entitled him to Atticus, *Deus ille noſter;* thinks, that if Jupiter had ſpoken Greek, he would have ſpoken in Plato's language, and made him ſo implicitly his guide in wiſdom and philoſophy, as to declare, that he had rather err with Plato than be right with any one elſe. But, panegyric aſide, Plato was certainly a very wonderful man, of a large and comprehenſive mind, an imagination infinitely fertile, and of a moſt flowing and copious eloquence. Nevertheleſs, the ſtrength and heat of fancy prevailing in his compoſition over judgement, he was too apt to ſoar beyond the limits of earthly things, to range in the imaginary regions of general and abſtracted ideas; and on which account, though there is always a greatneſs and ſublimity in his manner, he did not philoſophize ſo much according to truth and nature as Ariſtotle, though Cicero did not ſcruple to give him the preference.

The writings of Plato are all in the way of dialogue; where he ſeems to deliver nothing from himſelf, but every thing as the ſentiments and opinions of others, of Socrates chiefly, of Timæus, &c. He does not mention himſelf anywhere, except once in his Phædo, and another time in his Apology for Socrates. His ſtyle, as Ariſtotle obſerved, is betwixt proſe and verſe: on which account, ſome have not ſcrupled to rank him with the poets. There is a better reaſon for ſo doing than the elevation and grandeur of his ſtyle: his matter is oftentimes the offſpring of imagination, inſtead of doctrines or truths deduced from nature. The firſt edition of Plato's works in Greek was put out by Aldus at Venice in 1513; but a Latin verſion of him by Marſilius Ficinus had been printed there in 1491. They were reprinted together at Lyons in 1588, and at Francfort in 1602. The famous printer Henry Stephens, in 1578, gave a moſt beautiful and correct edition of Plato's works at Paris, with a new Latin verſion by Serranus, in three volumes folio; and this deſervedly paſſes for the beſt edition of Plato: yet Serranus's edition is very exceptionable, and in many reſpects, if not in all, inferior to that of Ficinus.

PLATONIC, ſomething that relates to Plato, his ſchool-philoſophy, opinions, or the like. Thus, platonic love denotes a pure ſpiritual affection, for which Plato was a great advocate, ſubſiſting between the different ſexes, abſtracted from all carnal appetites, and regarding no other object but the mind and its beauties; or it is even a ſincere diſintereſted friendſhip ſubſiſting between perſons of the ſame ſex, abſtracted from any ſelfiſh views, and regarding no other object than the perſon, if any ſuch love or friendſhip has aught of a foundation in nature.

PLATONIC Year, or the *Great Year*, is a period of time determined by the revolution of the equinoxes, or the ſpace wherein the ſtars and conſtellations return to their former places in reſpect of the equinoxes. The platonic year, according to Tycho Brahe, is 25816, according to Ricciolus 25910, and according to Caſſini 24800 years.

This period once accompliſhed, it was an opinion among the ancients that the world was to begin anew, and the ſame ſeries of things to turn over again.

PLATONISM, the philoſophy of Plato, which was divided into three branches, *theology*, *phyſics*, and *mathematics*. Under *theology* were comprehended metaphyſics and ethics, or that which in modern language is called *moral* philoſophy. Plato wrote likewiſe on *dialectics*, but with ſuch inferiority to his pupil Ariſtotle, that his works in that department of ſcience are ſeldom mentioned.

The ancient philoſophers always began their theological ſyſtems with ſome diſquiſition on the nature of the gods, and the formation of the world; and it was a fundamental doctrine with them, that *from nothing nothing can proceed*. We are not to ſuppoſe that this general axiom implied nothing more than that for every effect there muſt be a cauſe; for this is a propoſition which no man will controvert who underſtands the terms in which it is expreſſed: but the ancients believed that a proper creation is impoſſible even to omnipotence, and that to the production of any thing a *material* is not leſs *neceſſary* than an *efficient* cauſe, (ſee METAPHYSICS, N° 264—304.). That with reſpect to this important queſtion, Plato agreed with his predeceſſors and contemporaries, appears evident to us from the whole tenor of his *Timæus*. We agree with Dr Enfield * in thinking, that in this dialogue, which comprehends his whole doctrine on the ſubject of the formation of the univerſe, matter is ſo manifeſtly ſpoken of as eternally co-exiſting with God, that this part of his doctrine could not have been miſtaken by ſo many learned and able writers, had they not been ſeduced by the deſire of eſtabliſhing a coincidence of doctrine between the writings of Plato and Moſes. It is certain that neither Cicero †, nor Apuleius ‡, nor Alcinous §, nor even the later commentator Chalcidius, underſtood their maſter in any other ſenſe than as admitting two primary and incorruptible principles, God and matter; to which we ſhall afterwards ſee reaſon to add a third, namely ideas. The paſſages quoted by thoſe who maintain the contrary opinion are by no means ſufficient for their purpoſe. Plato, it is true, in his Timæus, calls God the *parent of the univerſe*, and in his Sophiſta ſpeaks of him as "forming animate and inanimate beings, which did not before exiſt:" but theſe expreſſions do not neceſſarily imply that this offſpring of Deity was produced from nothing, or that no prior matter exiſted from which theſe new beings were formed. Through the whole dialogue of the Timæus, Plato ſuppoſes two eternal and independent cauſes of all things; one, that by which all things are made, which is God; the other, that from which all things are made, which is matter. He diſtinguiſhes between God, matter, and the univerſe, and ſuppoſes the architect of the world to have formed it out of a maſs of pre-exiſtent matter. Matter, according to Plato, is an eternal and infinite principle. His doctrine on this head is thus explained by Cicero ‖. "Matter, from which all things are produced and formed, is a ſubſtance without form or quality, but capable of receiving all forms, and undergoing every kind of change; in which, however, it never ſuffers annihilation, but merely a ſolution of its parts, which are in their nature infinitely diviſible, and move in portions of ſpace which are alſo infinitely diviſible. When that principle which we call quality is moved, and acts upon matter, it undergoes an entire change, and thoſe forms are produced, from which ariſes the diverſified and coherent ſyſtem of the univerſe." This doctrine Plato unfolds at large in his Timæus, and particularly inſiſts upon the notion, that matter has originally no form, but is capable of receiving any. He calls it the mother and receptacle of forms, by the union of which with matter the univerſe becomes perceptible to the ſenſes; and maintains, that the viſible world owes its forms to the energy of the divine intellectual nature.

Our author is ſupported in drawing this inference by the teſtimony of Diogenes Laertius, who ſurely underſtood the language and dogmas of Plato better than the moſt accompliſhed modern ſcholar can pretend to do; yet a learned writer * has lately expreſſed great ſurpriſe that any one ſhould conſider matter as having been, in Plato's opinion, uncreated; and he boldly affirms, that Laertius, inſtead of aſſerting that ſpirit and matter were the principles of all things, ought to have ſaid that God alone, in Plato's eſtimation, was their original.—To prove this, he gives from the Timæus a quotation, in which the founder of the academy declares that God *framed* heaven and earth, and the inferior deities; and that as he *faſhioned*, ſo he pervades all nature. He obſerves, that Cicero denominates the god of

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* *Hiſt of Philoſophy.*

† *Ac. Qu.* lib. i. c. 6.

‡ Lib. i.

§ Cap. 12.

‖ *Ac. Qu.* lib. i. c. 8.

* *Dr Ogilvie.*

Plato the *maker*, and the god of Ariſtotle only the *governor*, of the world. And, to ſatisfy thoſe who may demand a particular proof of Plato's having taught a real creation, he affirms that his writings abound with declarations on the ſubject, of which the meaning cannot be miſapprehended. "With this purpoſe (ſays he) Plato denominates at one time the principles or ſubſtance of all things, Γεννηματα θεου Δημιουργου, the productions of the efficient Deity, and at others enters more particularly into the queſtion. Thus, he obſerves, that many perſons are ignorant of the nature and power of mind or intellect, 'as having exiſted at the beginning, antecedent to all bodies.' Of this mind, he obſerves, that it is without exception Παντων πρεσβυτατη, *of all things the moſt ancient;* and he ſubjoins, in order to remove all doubt of his purpoſe, that it is alſo Αρχη κινησεως, *the cauſe or principle of motion.*"

Theology of Plato.

With all poſſible reſpect for Dr Ogilvie, of whoſe piety and erudition we are thoroughly convinced, we muſt take the liberty to ſay, that to us the declarations of Plato on this ſubject appear much leſs preciſe and explicit than they appear to him; and that the inference which he would draw from the *words* of Cicero ſeems not to flow neceſſarily from the *ſenſe* of thoſe words. That Plato believed God to have *framed* the heaven and the earth, and to have *faſhioned* all nature, is a poſition which, as far as we know, has never been controverted; but between *framing* or *faſhioning* the chaos or ὑλη πρωτη, and calling the univerſe into exiſtence from nonentity, there is an infinite and an obvious difference. The diſtinction made by Cicero between the God of Plato and the God of Ariſtotle is a juſt diſtinction, but it will not bear the ſuperſtructure which the learned doctor builds upon it. Ariſtotle maintained the eternity of the world in its preſent form. Plato certainly taught that the firſt matter was in time reduced from a chaotic ſtate into *form* by the power of the Demiurgus; but we have ſeen nothing in his writings which explicitly declares his belief that the *firſt matter* was itſelf *created.*

The learned Cudworth, who wiſhed, like Dr Ogilvie, to find a coincidence of doctrine between the theology of Plato and that of the Goſpel, ſtrained all his faculties to prove that his favourite philoſopher taught a proper creation: but he laboured in vain. He gives a number of quotations in ſupport of his poſition; of which we ſhall here inſert only thoſe two upon which Dr Ogilvie ſeems to lay the greateſt ſtreſs. Plato, ſays the author of the Intellectual Syſtem, calls the one God (A) ὁς γην ουρανον και θεους, και παντα τα εν ουρανω και τα εν ἁδου, και ὑπο γης ἁπαντα εργαζεται—*He that makes earth, and heaven, and the gods, and doth all things both in heaven, and hell, and under the earth.* And, again, "he by whoſe efficiency the things of the world (ὑστερον εγενετο, προτερον ουκ οντα) *were afterwards made when they were not before* *." Both Cudworth and Ogilvie think this laſt ſentence an explicit declaration of Plato's belief in the creative power of God: but that they are miſtaken has been evinced by Moſheim with a force of argument which will admit of no reply. In that part of *the Sophiſt* from which the quotation is taken, Plato conſiders the δυναμιν ποιητικην, of which he is treating, as belonging both to God and to man; and he defines it in general to be "a certain power which is the cauſe that things may afterwards be which were not before." Cudworth wiſhes to confine this definition to the divine power; and adds from himſelf to the text which he quotes the following words, which are not in Plato, or FROM AN ANTECEDENT NON-EXISTENCE BROUGHT FORTH INTO BEING! That the incomparable author intended to deceive his reader, we are far from imagining: his zeal for Platoniſm had deceived himſelf. Plato's definition comprehends the δυναμιν ποιητικην; † as well of man as of God; and therefore cannot infer a creative power anywhere, unleſs the father of the academy was ſo very abſurd as to ſuppoſe human artiſts the creators of thoſe machines which they have invented and made! Moſheim thinks that Cudworth was miſled by too implicit a confidence in *Ficinus;* and it is not impoſſible that Dr Ogilvie may have been ſwayed by the authority, great indeed, of the author of the Intellectual Syſtem.

That intellect exiſted antecedent to all bodies is indeed a Platonic dogma, from which Dr Ogilvie, after Cudworth, wiſhes to infer that the doctrine of the creation was taught in the academy; but Dr Ogilvie knows, and no man knew better than Cudworth, that Plato, with every other Greek philoſopher, diſtinguiſhed between *body* and *matter;* and that though he held the priority of intellect to the former, it by no means follows that he believed it to have exiſted antecedent to the latter. That he believed *mind*, or rather *ſoul* (for he diſtinguiſhes between the two), to be the cauſe or principle of motion, cannot be denied; but we are not therefore authoriſed to conclude, that he likewiſe believed it to be the cauſe of the exiſtence of matter. That he believed mind to be the moſt ancient of *all things*, taking the word *things* in the moſt abſolute ſenſe, cannot be true, ſince by Dr Ogilvie's own acknowledgement he held the exiſtence and eternity of *ideas*, not to add that he believed το ἑν or τ'αγαθον—the firſt hypoſtaſis in his trinity, to be ſuperior to mind and prior to it, though not in time, yet in the order of nature. When therefore he calls mind the moſt ancient of *all things*, he muſt be ſuppoſed to mean only, that it is more ancient than *all bodies* and inferior ſouls. It is no reflection on the character of Plato that he could not, by the efforts of his own reaſon, acquire any notion of a proper creation; ſince we, who have the advantage of his writings, and of

* *Sophiſta*, p. 168.

† *Moſch. ed. Cud. Syſt. Intel.* cap. 4. §23. n. 11.

(A) Moſheim affirms that this quotation is nowhere to be found in the writings of Plato. He therefore at firſt ſuſpected that the learned author, in looking haſtily over Plato's 10th book *De Legibus*, had transferred to God what is there ſaid of the *anima mundi*, leading by its own motions every thing in the heaven, the earth, and the ſea, and that he had added ſomething of his own. He dropped that opinion, however, when he found Plato, in the 10th book of his Republic, declaring it to be as "eaſy for God to produce the ſun, moon, ſtars, and earth, &c. from himſelf, as it is for us to produce the image of ourſelves, and whatever elſe we pleaſe, only by interpoſing a looking-glaſs." In all this power, however, there is nothing ſimilar to that of creation.

writings infinitely more valuable, to inſtruct us, find it extremely difficult, if not impoſſible, to conceive how any thing can begin to be. We believe the fact on the authority of revelation; but ſhould certainly have never agitated ſuch a queſtion, had it not been ſtated to us by writers inſpired with celeſtial wiſdom.

In the Platonic coſmogony we cannot therefore doubt but that the eternity of the ὑλη πρωτη was taken for granted. Whether it was an eternal and neceſſary emanation from an eternal mind, is not perhaps quite ſo evident, though our own opinion is, that it was believed to be ſelf-exiſtent. But be this as it may, which is not worth diſputing, one thing is certain, that Plato did not believe it to have a ſingle form or quality which it did not receive either from the *Demiurgus* or the *Pſyche*—the ſecond or third perſon of this trinity. Except Ariſtotle, all the Greek philoſophers, who were not materialiſts, held nearly the ſame opinions reſpecting the origin of the world; ſo that in examining their ſyſtems we ſhall be greatly miſled if we underſtand the terms *incorporeal* and *immaterial* as at all ſynonymous. It was alſo a doctrine of Plato, that there is in matter a neceſſary but blind and refractory force; and that hence ariſes a propenſity in matter to diſorder and deformity, which is the cauſe of all the imperfection which appears in the works of God, and the origin of evil. On this ſubject Plato writes with wonderful obſcurity: but, as far as we are able to trace his conceptions, he appears to have thought, that matter, from its nature, reſiſts the will of the Supreme Artificer, ſo that he cannot perfectly execute his deſigns; and that this is the cauſe of the mixture of good and evil which is found in the material world.

Plato, however, was no materialiſt. He taught, that there is an intelligent cauſe, which is the origin of all ſpiritual being, and the former of the material world. The nature of this great being he pronounced it difficult to diſcover, and when diſcovered, impoſſible to divulge. The exiſtence of God he inferred from the marks of intelligence, which appear in the form and arrangement of bodies in the viſible world: and from the unity of the material ſyſtem he concluded, that the mind by which it was formed muſt be one. God, according to Plato, is the ſupreme intelligence, incorporeal, without beginning, end, or change, and capable of being perceived only by the mind. He certainly diſtinguiſhed the Deity not only from body, and whatever has corporeal qualities, but from matter itſelf, from which all things are made. He alſo aſcribed to him all thoſe qualities which modern philoſophers aſcribe to immaterial ſubſtance: and conceived him to be in his nature ſimple, uncircumſcribed in ſpace, the author of all regulated motion, and, in fine, poſſeſſed of intelligence in the higheſt perfection.

His notions of God are indeed exceedingly refined, and ſuch as it is difficult to ſuppoſe that he could ever have acquired but from ſome obſcure remains of primeval tradition, gleaned perhaps from the prieſts of Egypt or from the philoſophers of the Eaſt. In the Divine Nature he certainly believed that there are two, and probably that there are three, *hypoſtaſes*, whom he called το ον and το ἑν, νους and ψυχη. The firſt he conſidered as ſelf-exiſtent, and elevated far above all mind and all knowledge; calling him, by way of eminence, *the being*, or *the one*. The only attribute which he acknowledged in this perſon was goodneſs; and therefore he frequently ſtyles him το αγαθον—*the good*, or *eſſential goodneſs*. The ſecond he conſidered as mind, the *wiſdom* or *reaſon* of the firſt, and the *maker of the world*; and therefore he ſtyles him νους λογος and δημιουργος. The third he always ſpeaks of as the *ſoul of the world*; and hence calls him ψυχη, or ψυχη του κοσμου. He taught that the *ſecond* is a neceſſary emanation from the *firſt*, and the *third* from the *ſecond*, or perhaps from the *firſt* and *ſecond*.

Some have indeed pretended, that the *Trinity*, which is commonly called *Platonic*, was a fiction of the later Platoniſts, unknown to the founder of the ſchool: but any perſon who ſhall take the trouble to ſtudy the writings of Plato, will find abundant evidence that he really aſſerted a triad of divine hypoſtaſes, all concerned in the formation and government of the world. Thus in his 10th book of Laws, where he undertakes to prove the exiſtence of a Deity in oppoſition to atheiſts, he aſcends no higher in the demonſtration than to the ψυχη or mundane ſoul, which he held to be the immediate and proper cauſe of all the motion that is in the world. But in other parts of his writings he frequently aſſerts, as ſuperior to the ſelf-moving principle, an immoveable νους or intellect, which was properly the *demiurgus* or framer of the world; and above this *hypoſtaſis* one moſt ſimple and abſolutely perfect being, who is conſidered in his *Theology* as αὐτοθεος the *original deity*, in contradiſtinction from the others, who are only θεοι εκ θεου. Theſe doctrines are to be gathered from his works at large, particularly from the *Timæus*, *Philebus*, *Sophiſta* and *Epinomis*: but there is a paſſage in his ſecond epiſtle to Dionyſius, apparently written in anſwer to a letter, in which that monarch had required him to give a more explicit account than he had formerly done of the nature of God, in which the doctrine of a Trinity ſeems to be directly aſſerted. "After having ſaid that he meant to wrap up his meaning in ſuch obſcurity, as that an adept only ſhould fully comprehend it, he adds expreſſions to the following import: 'The Lord of Nature is ſurrounded on all ſides by his works: whatever is exiſts by his permiſſion: he is the fountain and ſource of excellence: around the ſecond perſon are placed things of the ſecond order; and around the third thoſe of the third degree (B)." Of this obſcure paſſage a very ſatisfactory explanation is given in Dr Ogilvie's *Theology of Plato*, to which the narrow limits preſcribed to ſuch articles as this compel us to refer the reader. We ſhall only ſay, that the account which we have given of the Platonic trinity is ably ſupported by the doctor.

In treating of the eternal emanation of the ſecond and third hypoſtaſes from the firſt, the philoſophers of the academy compare them to light and heat proceeding from the ſun. Plato himſelf, as quoted by Dr Cudworth, illuſtrates his doctrine by the ſame compariſon.

(B). "Περι των παντων βασιλεα, παντ' ἐςι, και Εκεινου ἑνεκα παντα. Εκεινος αἰτια παντων των καλων. Δευτερον δε περι τα δευτερα, και τριτον περι τα τριτα. Oper. p. 1269.

For "τ'αγαθον or the firſt hypoſtaſis, is in the intellectual world the ſame (he ſays) to intellect and intelligibles that the ſun is in the corporeal world to viſion and viſibles; for as the ſun is not viſion itſelf but the cauſe of viſion, and as that light by which we ſee is not the ſun but only a thing like the ſun; ſo neither is the Supreme or Higheſt Good properly knowledge, but the cauſe of knowledge; nor is intellect, conſidered as ſuch, the beſt and moſt perfect being, but only a being having the form of perfection." Again, "as the ſun cauſes other things not only to become viſible but alſo to be generated; ſo the Supreme Good gives to things not only their capability of being known, but alſo their very eſſences by which they ſubſiſt; for this fountain of the Deity, this higheſt good, is not itſelf properly eſſence, but above eſſence, tranſcending it in reſpect both of dignity and of power."

The reſemblance which this trinity of Plato bears to that revealed in the goſpel muſt be obſerved by every attentive reader; but the two doctrines are likewiſe in ſome reſpects exceedingly diſſimilar. The third hypoſtaſis in the Platonic ſyſtem appears in no point of view co-ordinate with the firſt or ſecond. Indeed the firſt is elevated far above the ſecond, and the third ſunk ſtill farther beneath it, being conſidered as a mere ſoul immerſed in matter, and forming with the corporeal world, to which it is united, one compound animal. Nay, it does not appear perfectly clear, that Plato conſidered his ψυχη του κοσμου as a pure ſpirit, or as having ſubſiſted from eternity as a diſtinct *Hypoſtaſis*. "This governing ſpirit, of whom the earth, properly ſo called, is the body, conſiſted, according to our author's philoſophy, of the ſame and the other; that is, of the firſt matter, and of pure intelligence, framed to actuate the machinery of nature. The Supreme Being placed him in the middle of the earth; which, in the vivid idea of Plato, ſeemed itſelf to live, in conſequence of an influence that was felt in every part of it. From this ſeat his power is repreſented as being extended on all ſides to the utmoſt limit of the heavens; conferring life, and preſerving harmony in the various and complicated parts of the univerſe. Upon this being God is ſaid to have looked with peculiar complacency after having formed him as an image of himſelf, and to have given beauty and perfect proportion to the manſion which he was deſtined to occupy. According to the doctrine of Timæus, the Supreme Being ſtruck out from this original mind innumerable ſpirits of inferior order, endowed with principles of reaſon; and he committed to divinities of ſecondary rank the taſk of inveſting theſe in material forms, and of diſperſing them as inhabitants of the ſun, moon, and other celeſtial bodies. He taught alſo, that at death the human ſoul is reunited to the ψυχη του κοσμου, as to the ſource from which it originally came."

Such is the third perſon of the Platonic triad, as we find his nature and attributes very accurately ſtated by Dr Ogilvie; and the Chriſtian philoſopher, who has no particular ſyſtem to ſupport, will not require another proof that the triad of Plato differs exceedingly from the Trinity of the Scriptures. Indeed the third hypoſtaſis in this triad has ſo much the appearance of all that the ancients could mean by that which we call a *creature*, that the learned Cudworth, who wiſhed, it is difficult to conceive for what reaſon, to find the ſublimeſt myſtery of the Chriſtian faith explicitly taught in the writings of a pagan philoſopher, was forced to ſuppoſe that Plato held a double ψυχη, or ſoul, one εγκοσμιον, incorporated with the material world, and the other υπερκοσμιον or *ſupramundane*, which is not the ſoul but the governor of the univerſe. We call this a mere hypotheſis; for though the author diſplays vaſt erudition, and adduces many quotations in which this double *pſyche* is plainly mentioned, yet all thoſe quotations are taken from Platoniſts who lived after the propagation of the goſpel, and who, calling themſelves *eclectics*, freely ſtole from every ſect ſuch dogmas as they could incorporate with their own ſyſtem, and then attributed thoſe dogmas to their maſter. In the writings of Plato himſelf, there is not ſo much as an alluſion to this ſupramundane *pſyche* *; and it is for this reaſon (the ψυχη, of which he treats being ſo very inferior to the δημιουργος and αγαθον) that we have expreſſed with heſitation his belief of *three* hypoſtaſes in the divine nature. Yet that he did admit ſo many, ſeems more than probable both from the paſſage illuſtrated by Dr Ogilvie, and from the attempt of Plotinus, one of his followers, to demonſtrate that the number can be neither greater nor leſs. That his doctrine on this ſubject ſhould be inaccurate and erroneous, can excite no wonder; whilſt it muſt be confeſſed to have ſuch a reſemblance to the truth, and to be ſo incapable of being proved by reaſoning from effects to cauſes, that we could not doubt of his having inherited it by tradition, even though we had not complete evidence that ſomething very ſimilar to it was taught long before him, not only by Pythagoras and Parmenides, but by the philoſophers of the eaſt.

We have ſaid that the Demiurgus was the maker of the world from the firſt matter which had exiſted from eternity; but in Plato's coſmogony there is another principle, more myſterious, if poſſible, than any thing which we have yet mentioned. This is his intellectual ſyſtem of *ideas*, which it is not eaſy to collect from his writings, whether he conſidered as *independent* exiſtences, or only as archetypal *forms*, which had ſubſiſted from eternity in the λογος or divine intellect. On this ſubject he writes with ſuch exceeding obſcurity, that men of the firſt eminence, both among the ancients and the moderns, have differed about his real meaning. Some have ſuppoſed, that by *ideas* he meant real beings ſubſiſting from eternity, independent of all minds, and ſeparate from all matter; and that of theſe ideas he conceived ſome to be living and others to be without life. In this manner his doctrine is interpreted by Tertullian * among the ancients, and by the celebrated Brucker † among the moderns; and not by them only, but by many others equally learned, candid, and acute. Cudworth, on the other hand, with his annotator Moſheim, contend, that by his ideal world Plato meant nothing more than that there exiſted from eternity in the λογος or mind of God a notion or conception of every thing which was in time to be made. This is certainly much more probable in itſelf, than that a man of enlarged underſtanding ſhould have ſuppoſed, that there are ſomewhere in extramundane ſpace real living incorporeal beings eating and drinking, which are the *ideas* of all the animals which ever have been or ever will be eating and drinking in this world. Yet Moſheim candidly acknowledges, that if the controverſy were to be decided by the votes of the learned, he is doubtful whether it would be given for or againſt him; and Cudworth, though he pleads

* *Moſch. ed. Cud. Syſt. Intel.* c. 4. § 36. n. 43.

* *Lib. de Anima.*

† *Hiſtor. Doctrin. de Idæis.*

pleads the cauſe of his maſter with much ingenuity, owns, that on this ſubject his language cannot be vindicated. This indeed is moſt true; for Plato contends, that his ideas are not only the objects of ſcience, but alſo the proper or phyſical cauſes of all things here below; that the *idea* of ſimilitude is the *cauſe* of the reſemblance between two globes; and the *idea* of diſſimilitude the cauſe that a globe does not reſemble a pyramid: he likewiſe calls them *ȣσιας*, *eſſences* or *ſubſtances*, and many of his followers have pronounced them to be *animals*.

Theſe wonderful expreſſions incline us to adopt with ſome heſitation the opinion ſtated by Dr Enfield. This hiſtorian of philoſophy having obſerved, that ſome of the admirers of Plato contend, that by ideas exiſting in the reaſon of God, nothing more is meant than conceptions formed in the Divine mind, controverts this opinion with much effect. "By ideas, Plato (ſays he) appears to have meant ſomething much more myſterious; namely, patterns or archetypes ſubſiſting by themſelves, as real beings, *οντως οντα* in the Divine reaſon, as in their original and eternal region, and iſſuing thence to give form to ſenſible things, and to become objects of contemplation and ſcience to rational beings. It is the doctrine of the Timæus, that *ὁ λογίσμος τȣ Θεȣ*, the reaſon of God, comprehends exemplars of all things, and that this reaſon is one of the primary cauſes of things. Plutarch ſays, that Plato ſuppoſes three principles, God, Matter, and Idea. Juſtin Martyr, Pſeudo-Origen, and others, aſſert the ſame thing.

"That this is the true Platonic doctrine of ideas will appear probable, if we attend to the manner in which Plato framed his ſyſtem of opinions concerning the origin of things. 'Having been from his youth (ſays Ariſtotle) converſant with Cratylus, a diſciple of Heraclitus, and inſtructed in the doctrine of that ſchool, that all ſenſible things are variable, and cannot be proper objects of ſcience, he reaſonably concluded, that if there be any ſuch thing as ſcience, there muſt exiſt, beſides ſenſible objects, certain permanent natures, perceptible only by the intellect.' Such natures, divine in their origin, and eternal and immutable in their exiſtence, he admitted into his ſyſtem, and called them *ideas*. Viſible things were regarded by Plato as fleeting ſhades, and ideas as the only permanent ſubſtances. Theſe he conceived to be the proper objects of ſcience to a mind raiſed by divine contemplation above the perpetually varying ſcenes of the material world."

It was a fundamental doctrine in the ſyſtem of Plato, that the Deity formed the material world after a perfect model, conſiſting of thoſe ideas which had eternally ſubſiſted in his own reaſon; and yet, with ſome appearance of contradiction, he calls this model "*ſelf*-exiſtent, indiviſible, and eternally *generated*." Nay, he talks of it as being intelligent as well as eternal, and wholly different from the tranſcripts, which are ſubjected to our inſpection. There is ſo much myſtery, confuſion, and apparent abſurdity, in the whole of this ſyſtem, as it has come down to us, that we muſt ſuppoſe the friends of Plato to have been entruſted with a key to his eſoteric doctrines, which has long been loſt, otherwiſe it would be difficult to conceive how that philoſopher could have had ſo many admirers.

With almoſt every ancient theiſt of Greece the founder of the academy believed in an order of beings called *dæmons*, which were ſuperior to the ſouls of men, and ſtruck off by the Demiurgus from the ſoul of the world. Of theſe the reader will find ſome account elſewhere: (See DÆMON and POLYTHEISM). We mention them at preſent becauſe they make an important appearance in Plato's ſyſtem of phyſics, which was built upon them and upon the doctrine which has been ſtated concerning God, matter, and ideas. He taught, that the viſible world was formed by the Supreme Architect, uniting eternal and immutable ideas to the firſt matter; that the univerſe is one animated being *, including within its limits all animated natures; that, in the formation of the viſible and tangible world, fire and earth were firſt formed, and were afterwards united by means of air and water; that from perfect parts one perfect whole was produced, of a ſpherical figure, as moſt beautiful in itſelf, and beſt ſuited to contain all other figures †; that the elementary parts of the world are of regular geometrical forms, the particles of earth being cubical, thoſe of fire pyramidical, thoſe of air in the form of an octohedron, and thoſe of water in that of an icoſohedron; that theſe are adjuſted in number, meaſure, and power, in perfect conformity to the geometrical laws of proportion; that the ſoul which pervades this ſphere is the cauſe of its revolution round its centre; and, laſtly, that the world will remain for ever, but that by the action of its animating principle, it accompliſhes certain periods, within which every thing returns to its ancient place and ſtate. This periodical revolution of nature is called the *Platonic* or *great year*. See the preceding article.

The metaphyſical doctrines of Plato, which treat of the human ſoul, and the principles of his ſyſtem of ethics, have been detailed in other articles (See METAPHYSICS, Part III. chap. iv.; and MORAL *Philoſophy*, N° 6.): but it is worthy of obſervation in this place, that, preparatory to the ſtudy of all philoſophy, he required from his diſciples a knowledge of the elements of mathematics. In his Republic, he makes Glaucus, one of the ſpeakers, recommend them for their uſefulneſs in human life. "Arithmetic for accounts and diſtributions; geometry for encampments and menſurations; muſic for ſolemn feſtivals in honour of the gods; and aſtronomy for agriculture, for navigation, and the like. Socrates, on his part, denies not the truth of all this, but ſtill inſinuates that they were capable of anſwering an end more ſublime. 'You are pleaſant (ſays he) in your ſeeming to fear the multitude, leſt you ſhould be thought to enjoin certain ſciences that are uſeleſs. 'Tis indeed no contemptible matter, though a difficult one, to believe, that through theſe particular ſciences the ſoul has an organ purified and enlightened, which is deſtroyed and blinded by ſtudies of other kinds; an organ better worth ſaving than a thouſand eyes, in as much as *truth* becomes viſible through *this alone*."

"Concerning policy, Plato has written at large in his Republic and in his Dialogue on Laws. He was ſo much enamoured with his own conceptions on this ſubject, that it was chiefly the hope of having an opportunity to realiſe his plan of a republic which induced him to viſit the court of Dionyſius. But they who are converſant with mankind, and capable of calmly inveſtigating the ſprings of human actions, will eaſily perceive that his projects were chimerical, and could only have originated in a mind replete with philoſophical enthuſiaſm. Of this nothing can be a clearer proof than the deſign of admi-

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* *Timæus*.

† *Ibid*.

ting in his republic a community of women, in order to give reaſon an entire controul over deſire. The main object of his political inſtitutions appears to have been, the ſubjugation of the paſſions and appetites, by means of the abſtract contemplation of ideas. A ſyſtem of policy, raiſed upon ſuch fanciful grounds, cannot merit a more diſtinct conſideration."

Such is genuine Platoniſm as it was taught in the old academy by the founder of the ſchool and his immediate followers; but when Arceſilaus was placed at the head of the academics, great innovations were introduced both into their doctrines and into their mode of teaching (ſee ARCESILAUS). This man was therefore conſidered as the founder of what was afterwards called the *middle* academy. Being a profeſſed ſceptic, he carried his maxim of uncertainty to ſuch a height, as to alarm the general body of philoſophers, offend the governors of the ſtate, and bring juſt odium upon the very name of the academy. At length *Carneades*, one of the diſciples of this ſchool, relinquiſhing ſome of the more obnoxious tenets of Arceſilaus, founded what has been called the *new* academy with very little improvement on the principles of the middle. See CARNEADES.

Under one or other of theſe forms Platoniſm found its way into the Roman republic. Cicero was a Platoniſt, and one of the greateſt ornaments of the ſchool. A ſchool of Platoniſts was likewiſe founded in Alexandria in the ſecond century of the Chriſtian era; but their doctrines differed in many particulars from thoſe taught in the three academies. They profeſſed to ſeek truth wherever they could find it, and to collect their dogmas from every ſchool. They endeavoured to bend ſome of the principles of Plato into a conformity with the doctrines of the goſpel; and they incorporated with the whole many of the maxims of Ariſtotle and Zeno, and not a few of the fictions of the eaſt. Their ſyſtem was therefore extremely heterogeneous, and ſeldom ſo rational as that of the philoſopher after whoſe name they were called, and of whoſe doctrines we have given ſo copious a detail. See AMMONIUS, ECCLECTICS, and PLOTINUS.

PLAUTUS, MARCUS ACCIUS, a comic writer of ancient Rome, born in Umbria, a province of Italy. His proper name was *Marcus Accius*, and he is ſuppoſed to have acquired the ſurname of *Plautus* from having ſplay feet. His parentage appears to have been mean; ſo that ſome have thought he was the ſon of a ſlave. Aulus Gellius ſays that Plautus was diſtinguiſhed for his poetry on the theatre, and Cato for his eloquence in the forum, at the ſame time; and obſerves elſewhere from Varro, that he was ſo well paid for his plays as to double his ſtock in trading, in which he loſt all he gained by the muſes. He is ſaid to have been reduced to work at a mill for his ſubſiſtence; but Varro adds, that his wit was his beſt ſupport, as he compoſed three of his plays during this drudgery. He died in the firſt year of the elder Cato's cenſorſhip, about the year of Rome 569, and 184 before Chriſt. We have 20 of his plays extant, though not all of them entire. Five of them, comedies, have been elegantly tranſlated into Engliſh by Mr B. Thornton, and publiſhed in 2 vols 8vo, 1767.

PLAYS. See the following article.

PLAYHOUSE. See THEATRE, AMPHITHEATRE, &c. The moſt ancient Engliſh playhouſes were the Curtain in Shoreditch and the Theatre. In the time of Shakeſpeare, who commenced a dramatic writer in 1592, there were no leſs than 10 theatres open. Four of theſe were private houſes, viz. that in Blackfriars, the Cockpit or Phœnix in Drury-Lane, a theatre in Whitefriars, and one in Saliſbury court. The other ſix were called public theatres, viz. the Globe, the Swan, the Roſe, and the Hope, on the Bank-ſide; the Red Bull, at the upper end of St John's ſtreet, and the Fortune in in White-croſs ſtreet. The two laſt were chiefly frequented by citizens. Mr Malone gives us a pretty copious account of theſe playhouſes, in a ſupplement to his laſt edition of Shakeſpeare, which we ſhall here inſert.

"Moſt, if not all (ſays he) of Shakeſpeare's plays were performed either at the Globe or at the Theatre in Blackfriars. It appears that they both belonged to the ſame company of comedians, viz. his majeſty's ſervants, which title they aſſumed, after a licence had been granted to them by King James in 1603, having before that time been called the ſervants of the lord chamberlain.

"The theatre in Blackfriars was a private houſe; but the peculiar and diſtinguiſhing marks of a private playhouſe it is not eaſy to aſcertain. It was very ſmall, and plays were there uſually repreſented by candle light. The Globe, ſituated on the ſouthern ſide of the river Thames, was a hexagonal building, partly open to the weather, partly covered with reeds. It was a public theatre, and of conſiderable ſize, and there they always acted by daylight. On the roof of the Globe, and the other public theatres, a pole was erected, to which a flag was affixed. Theſe flags were probably diſplayed only during the hours of exhibition; and it ſhould ſeem from a paſſage in one of the old comedies that they were taken down during Lent, in which ſeaſon no plays were preſented. The Globe, though hexagonal at the outſide, was probably a rotunda within, and perhaps had its name from its circular form. It might, however, have been denominated only from its ſign, which was a figure of Hercules ſupporting the Globe. This theatre was burnt down in 1613, but it was rebuilt in the following year, and decorated with more ornament than had been originally beſtowed upon it. The exhibitions at the Globe ſeem to have been calculated chiefly for the lower claſs of people; thoſe at Blackfriars for a more ſelect and judicious audience.

"A writer informs us, that one of theſe theatres was a winter and the other a ſummer houſe. As the Globe was partly expoſed to the weather, and they acted there uſually by daylight, it was probably the ſummer theatre. The exhibitions here ſeem to have been more frequent than at Blackfriars, at leaſt till the year 1604 or 1605, when the Bank-ſide appears to have become leſs faſhionable and leſs frequented than it formerly had been. Many of our ancient dramatic pieces were performed in the yards of carriers inns; in which, in the beginning of Queen Elizabeth's reign, the comedians, who then firſt united themſelves in companies, erected an occaſional ſtage. The form of theſe temporary playhouſes ſeems to be preſerved in our modern theatre. The galleries are in both ranged over each other on three ſides of the building. The ſmall rooms under the loweſt of theſe galleries anſwer to our preſent boxes; and it is obſervable that theſe, even in theatres which layhouſe.

were built in a ſubſequent period expreſsly for dramatic exhibitions, ſtill retained their old name, and are frequently called rooms by our ancient writers. The yard bears a ſufficient reſemblance to the pit, as at preſent in uſe. We may ſuppoſe the ſtage to have been raiſed in this area, on the fourth ſide, with its back to the gateway of the inn, at which the money for admiſſion was taken. Hence, in the middle of the Globe, and I ſuppoſe of the other public theatres, in the time of Shakeſpeare, there was an open yard or area, where the common people ſtood to ſee the exhibition; from which circumſtance they are called by our author groundlings, and by Ben Johnſon ' the underſtanding gentlemen of the ground.'

" In the ancient playhouſes there appears to have been a private box, of which it is not eaſy to aſcertain the ſituation. It ſeems to have been placed at the ſide of the ſtage towards the rear, and to have been at a lower price: in this ſome people ſat, either from economy or ſingularity. The galleries, or ſcaffolds as they are ſometimes called, and that part of the houſe which in private theatres was named the pit, ſeem to have been at the ſame price; and probably in houſes of reputation, ſuch as the Globe, and that in Blackfriars, the price of admiſſion into thoſe parts of the theatre was 6d. while in ſome meaner playhouſes it was only 1d. in others only 2d. The price of admiſſion into the beſt rooms or boxes was, I believe, in our author's time, 1s.; though afterwards it appears to have riſen to 2s. and half-a-crown.

" From ſeveral paſſages in our old plays, we learn, that ſpectators were admitted on the ſtage, and that the critics and wits of the time uſually ſat there. Some were placed on the ground; others ſat on ſtools, of which the price was either 6d. or 1s. according, I ſuppoſe, to the commodiouſneſs of the ſituation; and they were attended by pages, who furniſhed them with pipes and tobacco, which was ſmoaked here as well as in other parts of the houſe: yet it ſhould ſeem that perſons were ſuffered to ſit on the ſtage only in the private playhouſes, ſuch as Blackfriars, &c. where the audience was more ſelect, and of a higher claſs; and that in the Globe and other public theatres no ſuch licence was permitted.

" The ſtage was ſtrewed with ruſhes, which, as we learn from Hentzner and Caius de Ephemera, was, in the time of Shakeſpeare, the uſual covering of floors in England. The curtain which hangs in the front of the preſent ſtage, drawn up by lines and pulleys, though not a modern invention, for it was uſed by Inigo Jones in the maſques at court, was yet an apparatus to which the ſimple mechaniſm of our ancient theatres had not arrived, for in them the curtains opened in the middle, and were drawn backwards and forwards on an iron rod. In ſome playhouſes they were woollen, in others made of ſilk.—Towards the rear of the ſtage there appears to have been a balcony, the platform of which was probably eight or ten feet from the ground. I ſuppoſe it to have been ſupported by pillars. From hence, in many of our old plays, part of the dialogue was ſpoken; and in the front of this balcony curtains likewiſe were hung.

" A doubt has been entertained whether in our ancient theatres there were ſide and other ſcenes. The queſtion is involved in ſo much obſcurity, that it is very difficult to form any decided opinion upon it. It is certain, that in the year 1605 Inigo Jones exhibited an entertainment at Oxford, in which moveable ſcenes were uſed; but he appears to have introduced ſeveral pieces of machinery in the maſques at court, with which undoubtedly the public theatres were unacquainted. A paſſage which has been produced from one of the old comedies, proves, it muſt be owned, that even theſe were furniſhed with ſome pieces of machinery, which were uſed when it was requiſite to exhibit the deſcent of ſome god or ſaint; but from all the contemporary accounts, I am inclined to believe that the mechaniſm of our ancient ſtage ſeldom went beyond a painted chair or a trap-door, and that few, if any of them, had any moveable ſcenes. When King Henry VIII. is to be diſcovered by the dukes of Suffolk and Norfolk, reading in his ſtudy, the ſcenical direction in the firſt folio, 1623, which was printed apparently from playhouſe copies), is, ' the king draws the curtain, (*i. e.* draws it open), and ſits reading penſively;' for, beſides the principal curtains that hung in the front of the ſtage, they uſed others as ſubſtitutes for ſcenes. If a bed-chamber is to be exhibited, no change of ſcene is mentioned; but the property-man is ſimply ordered to thruſt forth a bed. When the fable requires the Roman capitol to be exhibited, we find two officers enter, 'to lay cuſhions, as it were, in the capitol,' &c. On the whole, it appears, that our ancient theatres, in general, were only furniſhed wlth curtains, and a ſingle ſcene compoſed of tapeſtry, which were ſometimes, perhaps, ornamented with pictures; and ſome paſſages in our old dramas incline one to think, that when tragedies were performed the ſtage was hung with black.

Playhouſe.

" In the early part, at leaſt, of our author's * acquaintance with the theatre, the want of ſcenery ſeems to have been ſupplied by the ſimple expedient of writing the names of the different places where the ſcene was laid in the progreſs of the play, which were diſpoſed in ſuch a manner as to be viſible to the audience. The invention of trap-doors, however, appears not to be modern; for in an old *morality*, intitled *All for Money*, we find a marginal direction which implies that they were very early in uſe. The covering, or internal roof of the ſtage, was anciently termed the heavens. It was probably painted of a ſky-blue colour, or perhaps pieces of drapery tinged with blue were ſuſpended acroſs the ſtage to repreſent the heavens.

" It is probable that the ſtage was formerly lighted by two large branches, of a form ſimilar to thoſe now hung in churches. They gave place in a ſubſequent period to ſmall circular wooden frames, furniſhed with candles, eight of which were hung on the ſtage, four at either ſide, and theſe within a few years were wholly removed by Mr Garrick, who, on his return from France, firſt introduced the preſent commodious method of illuminating the ſtage by lights not viſible to the audience. Many of the companies of players were formerly ſo thin, that one perſon played two or three parts; and a battle, on which the fate of an empire was ſuppoſed to depend was decided by half a dozen combatants. It appears to have been a common practice in their mock engagements to diſcharge ſmall pieces of ordnance on the ſtage. Before the exhibition began, three flouriſhes or pieces of muſic were played, or, in the ancient language, there were three ſoundings. Muſic was likewiſe played between the acts. The inſtruments chiefly uſed were trumpets, cornets, and

* *Shakeſpeare.*

hautboys. The band, which did not conſiſt of more than five or ſix performers, ſat in an upper balcony, over what is now called the ſtage-box.

" The perſon who ſpoke the prologue was uſhered in by trumpets, and uſually wore a long black velvet cloak, which, I ſuppoſe, was conſidered as beſt ſuited to a ſupplicatory addreſs. Of this cuſtom, whatever might have been its origin, ſome traces remained till very lately, a black coat having been, if I miſtake not, within theſe few years, the conſtant ſtage-habiliment of our modern prologue-ſpeakers. The dreſs of the ancient prologue-ſpeaker is ſtill retained in the play that is exhibited in Hamlet before the king and court of Denmark. The performers of male characters generally wore periwigs, which in the age of Shakeſpeare were not in common uſe. It appears, from a paſſage in Puttenham's *Art of Engliſh Poeſy*, 1589, that vizards were on ſome occaſions uſed by the actors of thoſe days; and it may be inferred, from a ſcene in one of our author's comedies, that they were ſometimes worn in his time by thoſe who performed female characters; but this I imagine was very rare. Some of the female part of the audience likewiſe appeared in maſks. The ſtage-dreſſes, it is reaſonable to ſuppoſe, were much more coſtly at ſome theatres than at others; yet the wardrobe of even the king's ſervants at the Globe and Blackfriars, was, we find, but ſcantily furniſhed; and our author's dramas derived very little aid from the ſplendor of exhibition.

" It is well known, that in the time of Shakeſpeare, and for many years afterwards, female characters were repreſented by boys or young men. Sir William d'Avenant, in imitation of the foreign theatres, firſt introduced females in the ſcene, and Mrs Betterton is ſaid to have been the firſt woman that appeared on the Engliſh ſtage. Andrew Pennycuike played the part of Matilda in a tragedy of Davenport's, in 1655; and Mr Kynaſton acted ſeveral female parts after the Reſtoration. Downes, a contemporary of his, aſſures us, ' that being then very young he made a complete ſtage beauty, performing his parts ſo well, particularly Arthiope and Aglaura, that it has ſince been diſputable among the judicious whether any woman that ſucceeded him touched the audience ſo ſenſibly as he.'

" Both the prompter, or book-holder, as he was ſometimes called, and the property-man, appear to have been regular appendages of our ancient theatres. No writer that I have met with intimates, that in the time of Shakeſpeare it was cuſtomary to exhibit more than a ſingle dramatic piece on one day. The Yorkſhire tragedy, or *All's One*, indeed, appears to have been one of four pieces that were repreſented on the ſame day; and Fletcher has alſo a piece called *Four Plays in One;* but probably theſe were either exhibited on ſome particular occaſion, or were ineffectual efforts to introduce a new ſpecies of amuſement; for we do not find any other inſtances of the ſame kind. Had any ſhorter pieces been exhibited after the principal performance, ſome of them probably would have been printed: but there are none extant of an earlier date than the time of the Reſtoration. The practice, therefore, of exhibiting two dramas ſucceſſively in the ſame evening, we may be aſſured was not eſtabliſhed before that period. But though the audiences in the time of our author were not gratified by the repreſentation of more than one drama in the ſame day, the entertainment was diverſified, and the populace diverted, by vaulting, tumbling, ſlight of hand, and morris-dancing, a mixture not much more heterogeneous than that with which we are daily preſented, a tragedy and a farce.

" The amuſements of our anceſtors, before the commencement of the play, were of various kinds, ſuch as reading, playing at cards, drinking ale, or ſmoaking tobacco. It was a common practice to carry table-books to the theatre, and either from curioſity or enmity to the author, or ſome other motive, to write down paſſages of the play that was repreſented: and there is reaſon to believe that the imperfect and mutilated copies of ſome of Shakeſpeare's dramas, which are yet extant, were taken down in ſhort-hand during the exhibition. At the end of the piece, the actors, in noblemen's houſes and in taverns, where plays were frequently performed, prayed for the health and proſperity of their patrons; and in the public theatres for the king and queen. This prayer ſometimes made part of the epilogue. Hence, probably, as Mr Steevens has obſerved, the addition of *Vivant rex et regina* to the modern play-bills.

" Plays, in the time of our author, began at one o'clock in the afternoon; and the exhibition was uſually finiſhed in two hours. Even in 1667 they commenced at three. When Goſſon wrote his *School of Abuſe*, in 1579, it ſeems the dramatic entertainments were uſually exhibited on Sundays. Afterwards they were performed on that and other days indiſcriminately. It appears from a contemporary writer, that exhibiting plays on Sunday had not been aboliſhed in the third year of King Charles I.

" The modes of conveyance to the theatre, anciently as at preſent, ſeem to have been various; ſome going in coaches, others on horſeback, and many by water.—To the Globe playhouſe the company probably were conveyed by water; to that in Blackfriars the gentry went either in coaches or on horſeback, and the common people on foot. In an epigram to Sir John Davis, the practice of riding to the theatre is ridiculed as a piece of affectation or vanity, and therefore we may preſume it was not very general.

" The long and whimſical titles that are prefixed to the quarto copies of our author's plays, I ſuppoſe to have been tranſcribed from the play-bills of the time. A contemporary writer has preſerved ſomething like a play-bill of thoſe days, which ſeems to corroborate this obſervation; for if it were diveſted of rhime, it would bear no very diſtant reſemblance to the title pages that ſtand before ſome of our author's dramas:

" ———Prithee, what's the play?
" (The firſt I viſited this twelvemonth day)
" They ſay " A new invented play of Purle,
" That jeoparded his neck to ſteal a girl
" Of twelve; and lying faſt impounded for't,
" Has hither ſent his beard to act his part;
" Againſt all thoſe in open malice bent,
" That would not freely to the theft conſent:
" Feigns all to's wiſh, and in the epilogue
" Goes out applauded for a famous rogue."
" —Now hang me if I did not look at firſt
" For ſome ſuch ſtuff, by the fond people's thruſt."

" It is uncertain at what time the uſage of giving authors a benefit on the third day of the exhibition of their pieces commenced. Mr Oldys, in one of his manuſcripts, intimates that dramatic poets had anciently their benefit on the firſt day that a new play was repreſented; a regulation lition which would have been very favourable to ſome of the ephemeral productions of modern times. But for this there is not, I believe, any ſufficient authority. From D'Avenant, indeed, we learn, that in the latter part of the reign of Queen Elizabeth the poet had his benefit on the ſecond day. As it was a general practice in the time of Shakeſpeare to ſell the copy of the play to the theatre, I imagine in ſuch caſes an author derived no other advantage from his piece than what aroſe from the ſale of it. Sometimes, however, be found it more beneficial to retain the copyright in his own hands; and when he did ſo, I ſuppoſe he had a benefit. It is certain that the giving authors the profit of the third exhibition of their play, which ſeems to have been the uſual mode during almoſt the whole of the laſt century, was an eſtabliſhed cuſtom in the year 1612, for Decker, in the prologue to one of his comedies printed in that year, ſpeaks of the poet's third day. The unfortunate Otway had no more than one benefit on the production of a new play; and this too, it ſeems, he was ſometimes forced to mortgage before the piece was acted. Southerne was the firſt dramatic writer who obtained the emoluments ariſing from two repreſentations; and to Farquhar, in the year 1700, the benefit of a third was granted. When an author ſold his piece to the ſharers or proprietors of a theatre, it remained for ſeveral years unpubliſhed; but when that was not the caſe, he printed it for ſale, to which many ſeem to have been induced, from an apprehenſion that an imperfect copy might be iſſued from the preſs without their conſent. The cuſtomary price of the copy of a play in the time of Shakeſpeare appears to have been twenty nobles, or ſix pounds thirteen ſhillings and four pence. The play when printed was ſold for ſixpence; and the uſual preſent from a patron in return for a dedication was forty ſhillings. On the firſt day of exhibiting a new play, the prices of admiſſion appear to have been raiſed; and this ſeems to have been occaſionally practiſed on the benefit-nights of authors to the end of the laſt century. The cuſtom of paſſing a final cenſure on plays at their firſt exhibition is as ancient as the time of our author; for no leſs than three plays of his rival Ben Jonſon appear to have been damned; and Fletcher's Faithful Shepherdeſs, and The Knight of the Burning Peſtle, written by him and Beaumont, underwent the ſame fate.

"It is not eaſy to aſcertain what were the emoluments of a ſucceſsful actor in the time of Shakeſpeare. They had not then annual benefits as at preſent. The performers at each theatre ſeem to have ſhared the profits ariſing either from each day's exhibition or from the whole ſeaſon among them. From Ben Jonſon's Poetaſter we learn, that one of either the performers or proprietors had ſeven ſhares and a half; but of what integral ſum is not mentioned. From the prices of admiſſion into our ancient theatres, which have been already mentioned, I imagine the utmoſt that the ſharers of the Globe playhouſe could have received on any one day was about 35l. So lately as the year 1685, Shadwell received by his third day on the repreſentation of the Squire of Alſatia, 130l.; which Downes the prompter ſays was the greateſt receipt that had been ever taken at Drury-Lane playhouſe at ſingle prices. It appears from the MSS. of Lord Stanhope, treaſurer of the chambers to King James I. that the cuſtomary ſum paid to John Heminge and his company for the performance of a play at court was twenty nobles, or ſix pounds thirteen ſhillings and four pence. And Edward Alleyn mentions in his Diary, that he once had ſo ſlender an audience in his theatre called the *Fortune*, that the whole receipts of the houſe amounted to no more than three pounds and ſome odd ſhillings.

"Thus ſcanty and meagre were the apparatus and accommodations of our ancient theatres, on which thoſe dramas were firſt exhibited, that have ſince engaged the attention of ſo many learned men, and delighted ſo many thouſand ſpectators. Yet even then, we are told by a writer of that age, 'that dramatic poeſy was ſo lively expreſſed and repreſented on the public ſtages and theatres of this city, as Rome in the age of her pomp and glory never ſaw it better performed; in reſpect of the action and art, not of the coſt and ſumptuouſneſs.'"

PLEA, in *Law*, is what either party alleges for himſelf in court, in a cauſe there depending; and in a more reſtrained ſenſe, it is the defendant's anſwer to the plaintiff's declaration.

Pleas are uſually divided into thoſe of the crown and common pleas. Pleas of the crown are all ſuits in the king's name, or in the name of the attorney-general in behalf of the king, for offences committed againſt his crown and dignity, and againſt his peace; as treaſon, murder, felony, &c. See ARRAIGNMENT.

Blackſt. Comment.

Common pleas are ſuch ſuits as are carried on between common perſons in civil caſes. Theſe pleas are of two ſorts; *dilatory* pleas, and pleas *to the action*. Dilatory pleas are ſuch as tend merely to delay or put off the ſuit, by queſtioning the propriety of the remedy, rather than by denying the injury: pleas to the action are ſuch as diſpute the very cauſe of ſuit.

I. *Dilatory* pleas are, 1. To the juriſdiction of the court: alleging, that it ought not to hold plea of this injury, it ariſing in Wales or beyond ſea: or becauſe the land in queſtion is of ancient demeſne, and ought only to be demanded in the lord's court, &c. 2. To the diſability of the plaintiff, by reaſon whereof he is incapable to commence or continue the ſuit; as, that he is an alien enemy, outlawed, excommunicated, attainted of treaſon or felony, under a præmunire, not *in rerum natura* (being only a fictitious perſon), an infant, a feme-covert, or a monk profeſſed. 3. In abatement: which abatement is either of the writ, or the count, for ſome defect in one of them; as by miſnaming the defendant, which is called a *miſnomer;* giving him a wrong addition, as eſquire inſtead of knight; or other want of form in any material reſpect. Or, it may be that the plaintiff is dead; for the death of either party is at once an abatement of the ſuit.

Theſe pleas to the juriſdiction, to the diſability, or in abatement, were formerly very often uſed as mere dilatory pleas, without any foundation in truth, and calculated only for delay; but now by ſtat. 4 & 5 Ann. c. 16. no dilatory plea is to be admitted without affidavit made of the truth thereof, or ſome probable matter ſhown to the court to induce them to believe it true. And with reſpect to the pleas themſelves, it is a rule, that no exception ſhall be admitted againſt a declaration or writ, unleſs the defendant will in the ſame plea give the plaintiff a better; that is, ſhow him how it might be amended, that there may not be two objections upon the ſame account.

All pleas to the juriſdiction conclude to the cognizance of the court; praying "judgement whether the court will have farther cognizance of the ſuit." Pleas to the diſability conclude to the perſon; by praying "judgement, if the ſaid A the plaintiff ought to be anſwered:" And pleas in abatement (when the ſuit is by original) conclude to the writ, or declaration; by praying "judgement of the writ, or declaration, and that the ſame may be quaſhed," *caſſetur*, made void, or abated: but if the action be by bill, the plea muſt pray "judgement of the bill," and not of the declaration; the bill being here the original, and the declaration only a copy of the bill.

When theſe dilatory pleas are allowed, the cauſe is either diſmiſſed from that juriſdiction, or the plaintiff is ſtayed till his diſability be removed; or he is obliged to ſue out a new writ, by leave obtained from the court, or to amend and new-frame his declaration. But when, on the other hand, they are overruled as frivolous, the defendant has judgement of *reſpondeat ouſter*, or to anſwer over in ſome better manner. It is then incumbent on him to plead.

2. A plea *to the action;* that is, to anſwer to the merits of the complaint. This is done by confeſſing or denying it.

A confeſſion of the whole complaint is not very uſual; for then the defendant would probably end the matter ſooner, or not plead at all, but ſuffer judgement to go by default. Yet ſometimes, after tender and refuſal of a debt, if the creditor haraſſes his debtor with an action, it then becomes neceſſary for the defendant to acknowledge the debt, and plead the tender; adding, that he has always been ready, *tout temps priſt*, and is ſtill ready, *uncore priſt*, to diſcharge it: for a tender by the debtor and refuſal by the creditor will in all caſes diſcharge the coſts, but not the debt itſelf; though in ſome particular caſes the creditor will totally loſe his money. But frequently the defendant confeſſes one part of the complaint (by a *cognovit actionem* in reſpect thereof), and traverſes or denies the reſt; in order to avoid the expence of carrying that part to a formal trial, which he has no ground to litigate. A ſpecies of this ſort of confeſſion is the *payment of money into court:* which is for the moſt part neceſſary upon pleading a tender, and is itſelf a kind of tender to the plaintiff; by paying into the hands of the proper officer of the court as much as the defendant acknowledges to be due, together with the coſts hitherto incurred, in order to prevent the expence of any farther proceedings. This may be done upon what is called a *motion;* which is an occaſional application to the court by the parties or their counſel, in order to obtain ſome rule or order of court, which becomes neceſſary in the progreſs of a cauſe: and it is uſually grounded upon an *affidavit* (the perfect tenſe of the verb *affido*), being a vountary oath before ſome judge or officer of the court, to evince the truth of certain facts, upon which the motion is grounded: though no ſuch affidavit is neceſſary for payment of money into court. If, after the money is paid in, the plaintiff proceeds in his ſuit, it is at his own peril: for if he does not prove more due than is ſo paid into court, he ſhall be nonſuited and pay the defendant's coſts; but he ſhall ſtill have the money ſo paid in, for that the defendant has acknowledged to be his due. To this head may alſo be referred the practice of what is called a *ſet off;* whereby the defendant acknowledges the juſtice of the plaintiff's demand on the one hand; but on the other, ſets up a demand of his own, to counterbalance that of the plaintiff, either in the whole or in part; as, if the plaintiff ſues for ten pounds due on a note of hand, the defendant may ſet off nine pounds due to himſelf for merchandiſe ſold to the plaintiff; and, in caſe he plead ſuch ſet-off, muſt pay the remaining balance into court.

Pleas that totally deny the cauſe of complaint are either the general iſſue, or a ſpecial plea in bar.

1. The *general iſſue*, or general plea, is what traverſes, thwarts, and denies at once, the whole declaration, without offering any ſpecial matter whereby to evade it. As in treſpaſs either *vi et armis*, or on the caſe, "*non culpabilis*, not guilty;" in debt upon contract, "*nihil debet*, he owes nothing;" in debt on bond, *non eſt factum*, it is not his deed;" on an *aſſumpſit*, "*non aſſumpſit*, he made no ſuch promiſe." Or in real actions, "*nul tort*, no wrong done; *nul diſſeiſin*, no diſſeiſin;" and in a writ of right, the miſe or iſſue is, that "the tenant has more right to hold than the demandant has to demand." Theſe pleas are called the *general iſſue*, becauſe, by importing an abſolute and general denial of what is alleged in the declaration, they amount at once to an iſſue; by which we mean a fact affirmed on one ſide and denied on the other.

2. *Special* pleas in bar of the plaintiff's demands are very various, according to the circumſtances of the defendant's caſe. As, in real actions, a general releaſe or a fine; both of which may deſtroy and bar the plaintiff's title. Or, in perſonal actions, an accord, arbitration, conditions performed, nonage of the defendant, or ſome other fact which precludes the plaintiff from his action. A *juſtification* is likewiſe a ſpecial plea in bar; as in actions of aſſault and battery, *ſon aſſault demeſne*, that it was the plantiff's own original aſſault; in treſpaſs, that the defendant did the thing complained of in right of ſome office which warranted him ſo to do; or, in an action of ſlander, that the plaintiff is really as bad a man as the defendant ſaid he was.

Alſo a man may plead the ſtatutes of limitation in bar; or the time limited by certain acts of parliament, beyond which no plaintiff can lay his cauſe of action. This, by the ſtatute of 32 Hen. VIII. c. 2. in a writ of right is 60 years: in aſſizes, writs of entry, or other poſſeſſory actions real, of the ſeiſin of one's anceſtors in lands; and either of their ſeiſin, or one's own, in rents, ſuits, and ſervices, 50 years: and in actions real for lands grounded upon one's own ſeiſin or poſſeſſion, ſuch poſſeſſion muſt have been within 30 years. By ſtatute 1 Mar. ſt. 2. c. 5. this limitation does not extend to any ſuit for avowſons. But by the ſtatute 21 Jac. I. c. 2. a time of limitation was extended to the caſe of the king; viz. 60 years precedent to 19th Feb. 1623; but, this becoming ineffectual by efflux of time, the ſame date of limitation was fixed by ſtatute 9 Geo. III. c. 16. to commence and be reckoned backwards, from the time of bringing any ſuit or other proceſs to recover the thing in queſtion; ſo that a poſſeſſion for 60 years is now a bar even againſt the prerogative, in derogation of the ancient maxim, *Nullum tempus occurrit regi.* By another ſtatute, 21 Jac. I. c. 16. 20 years is the time of limitation in any writ of formedon: and, by a conſequence, 20 years is alſo the limitation in every action of ejectment; for no ejectment can be brought, unleſs where

Plea. where the leſſor of the plaintiff is entitled to enter on the lands: and by the ſtatute 21 Jac. I. c. 16. no entry can be made by any man, unleſs within 20 years after his right ſhall accrue. Alſo all actions of treſpaſs (*quare clauſum fregit*, or otherwiſe), detinue, trover, replevin, account, and caſe (except upon accounts between merchants), debt on ſimple contract, or for arrears of rent, are limited by the ſtatute laſt mentioned to ſix years after the cauſe of action commenced: and actions of aſſault, menace, battery, mayhem, and impriſonment, muſt be brought within four years, and actions for words two years, after the injury committed. And by the ſtatute 31 Eliz. c. 5. all ſuits, indictments, and informations, upon any penal ſtatutes, where any forfeiture is to the crown, ſhall be ſued within two years, and where the forfeiture is to a ſubject, within one year, after the offence committed, unleſs where any other time is ſpecially limited by the ſtatute. Laſtly, by ſtatute 10 W. III. c. 14. no writ of error, *ſcire facias*, or other ſuit, ſhall be brought to reverſe any judgement, fine, or recovery, for error, unleſs it be proſecuted within 20 years. The uſe of theſe ſtatutes of limitation is to preſerve the peace of the kingdom, and to prevent thoſe innumerable perjuries which might enſue if a man were allowed to bring an action for any injury committed at any diſtance of time. Upon both theſe accounts the law therefore holds, that *intereſt reipublicæ ut ſit finis litium:* and upon the ſame principle the Athenian laws in general prohibited all actions where the injury was committed five years before the complaint was made. If therefore, in any ſuit, the injury, or cauſe of action, happened earlier than the period expreſsly limited by law, the defendant may plead the ſtatutes of limitations in bar: as upon an *aſſumpſit*, or promiſe to pay money to the plaintiff, the defendant may plead, *Non aſſumpſit infra ſex annos*, He made no ſuch promiſe within ſix years; which is an effectual bar to the complaint.

An *eſtoppel* is likewiſe a ſpecial plea in bar: which happens where a man hath done ſome act, or executed ſome deed, which eſtops or precludes him from averring any thing to the contrary. As if a tenant for years (who hath no freehold) levies a fine to another perſon. Though this is void as to ſtrangers, yet it ſhall work as an eſtoppel to the cognizor; for, if he afterwards brings an action to recover theſe lands, and his fine is pleaded againſt him, he ſhall thereby be eſtopped from ſaying, that he had no freehold at the time, and therefore was incapable of levying it.

The conditions and qualities of a plea (which, as well as the doctrine of eſtoppels, will alſo hold equally, *mutatis mutandis*, with regard to other parts of pleading), are, 1. That it be ſingle and containing only one matter; for duplicity begets confuſion. But by ſtatute 4 and 5 Ann. c. 16. a man, with leave of the court, may plead two or more diſtinct matters or ſingle pleas; as in an action of aſſault and battery, theſe three, Not guilty, *ſon aſſault demeſne*, and the ſtatute of limitations. 2. That it be direct and poſitive, and not argumentative. 3. That it have convenient certainty of time, place, and perſons. 4. That it anſwer the plaintiff's allegations in every material point. 5. That it be ſo pleaded as to be capable of trial.

Special pleas are uſually in the affirmative, ſometimes in the negative, but they always advance ſome new fact not mentioned in the declaration; and then they muſt be averred to be true in the common form:—"And this he is ready to verify."—This is not neceſſary in pleas of the general iſſue, thoſe always containing a total denial of the facts before advanced by the other party, and therefore putting him upon the proof of them. See PLEADINGS.

Plea to Indictment, the defenſive matter alleged by a criminal on his indictment; (ſee ARRAIGNMENT.) This is either, 1. A plea to the juriſdiction; 2. A demurrer; 3. A plea in abatement; 4. A ſpecial plea in bar; or, 5. The general iſſue.

Blackſt. Comment.

I. A plea to the *juriſdiction*, is where an indictment is taken before a court that hath no cognizance of the offence: as if a man be indicted for a rape at the ſheriff's tourn, or for treaſon at the quarter-ſeſſions: in theſe or ſimilar caſes, he may except to the juriſdiction of the court, without anſwering at all to the crime alleged.

II. A *demurrer* to the indictment, is incident to criminal caſes, as well as civil, when the fact as alleged is allowed to be true, but the priſoner joins iſſue upon ſome point of law in the indictment, by which he inſiſts, that the fact, as ſtated, is no felony, treaſon, or whatever the crime is alleged to be. Thus, for inſtance, if a man be indicted for feloniouſly ſtealing a greyhound; which is an animal in which no valuable property can be had, and therefore it is not felony, but only a civil treſpaſs to ſteal it: in this caſe the party indicted may demur to the indictment; denying it to be felony, though he confeſſes the act of taking it. Some have held, that if, on demurrer, the point of law be adjudged againſt the priſoner, he ſhall have judgement and execution, as if convicted by verdict. But this is denied by others, who hold, that in ſuch caſe he ſhall be directed and received to plead the general iſſue, Not guilty, after a demurrer determined againſt him. Which appears the more reaſonable, becauſe it is clear, that if the priſoner freely diſcovers the fact in court, and refers it to the opinion of the court whether it be felony or no; and upon the fact thus ſhown, it appears to be felony, the court will not record the confeſſion, but admit him afterwards to plead not guilty. And this ſeems to be a caſe of the ſame nature, being for the moſt part a miſtake in point of law, and in the conduct of his pleading; and, though a man by miſpleading may in ſome caſes loſe his property, yet the law will not ſuffer him by ſuch niceties to loſe his life. However, upon this doubt, demurrers to indictments are ſeldom uſed: ſince the ſame advantages may be taken upon a plea of not guilty; or afterwards, in arreſt of judgement, when the verdict has eſtabliſhed the fact.

III. A plea in *abatement* is principally for a miſnomer, a wrong name, or a falſe addition to the priſoner. As, if James Allen, gentleman, is indicted by the name of *John Allen, eſquire*, he may plead that he has the name of *James*, and not of *John*; and that he is a *gentleman*, and not an *eſquire*. And, if either fact is found by a jury, then the indictment ſhall be quaſhed, as writs or declarations may be in civil actions. But, in the end, there is little advantage accruing to the priſoner by means of theſe dilatory pleas; becauſe, if the exception be allowed, a new bill of indictment may be framed, according to what the priſoner in his plea avers to be his true name and addition. For it is a rule, upon all pleas in abatement, that he who takes advantage of a flaw, muſt at the ſame time ſhow how it may be amended. Let us therefore next conſider a more ſubſtantial kind of plea, viz.

IV. Special pleas in *bar;* which go to the merits of the indictment, and give a reaſon why the priſoner ought not to anſwer it at all, nor put himſelf upon his trial for the crime alleged. Theſe are of four kinds: a former acquittal, a former conviction, a former attainder, or a pardon. There are many other pleas which may be pleaded in bar of an appeal: but theſe are applicable to both appeals and indictments.

1. Firſt, the plea of *auterfoits acquit*, or a former acquittal, is grounded on this univerſal maxim of the common law of England, that no man is to be brought into jeopardy of his life, more than once, for the ſame offence. And hence it is allowed as a conſequence, that when a man is once fairly found not guilty upon any indictment, or other proſecution, before any court having competent juriſdiction of the offence, he may plead ſuch acquittal in bar of any ſubſequent accuſation for the ſame crime.

2. Secondly, the plea of *auterfoits convict*, or a former conviction for the ſame identical crime, though no judgement was ever given, or perhaps will be (being ſuſpended by the benefit of clergy or other cauſes), is a good plea in bar to an indictment. And this depends upon the ſame principle as the former, that no man ought to be twice brought in danger of his life for one and the ſame crime.

3. Thirdly, the plea of *auterfoits attaint*, or a former attainder, is a good plea in bar, whether it be for the ſame or any other felony. For wherever a man is attainted of felony, by judgement of death either upon a verdict or confeſſion, by outlawry, or heretofore by abjuration, and whether upon an appeal or an indictment; he may plead ſuch attainder in bar to any ſubſequent indictment or appeal, for the ſame or for any other felony. And this becauſe, generally, ſuch proceeding on a ſecond proſecution cannot be to any purpoſe; for the priſoner is dead in law by the firſt attainder, his blood is already corrupted, and he hath forfeited all that he had: ſo that it is abſurd and ſuperfluous to endeavour to attaint him a ſecond time. Though to this general rule, as to all others, there are ſome exceptions; wherein, *ceſſante ratione, ceſſat et ipſa lex.*

4. Laſtly, a pardon may be pleaded in bar; as at once deſtroying the end and purpoſe of the indictment, by remitting that puniſhment, which the proſecution is calculated to inflict. There is one advantage that attends pleading a pardon in bar, or in the arreſt of judgement before ſentence is paſt; which gives it by much the preference to pleading it after ſentence or attainder. This is, that by ſtopping the judgement it ſtops the attainder, and prevents the corruption of the blood: which, when once corrupted by attainder, cannot afterwards be reſtored otherwiſe than by act of parliament.

V. The *general iſſue*, or plea of not guilty, upon which plea alone the priſoner can receive his final judgement of death. In caſe of an indictment of felony or treaſon, there can be no ſpecial juſtification put in by way of plea. As, on an indictment for murder, a man cannot plead that it was in his own defence againſt a robber on the highway, or a burglar; but he muſt plead the general iſſue, Not guilty, and give this ſpecial matter in evidence. For (beſides that theſe pleas do in effect amount to the general iſſue; ſince, if true, the priſoner is moſt clearly not guilty) as the facts in treaſon are laid to be done *proditorie et contra ligeantiæ ſuæ debitum;* and, in felony, that the killing was done *felonice;* theſe charges, of a traiterous or felonious intent, are the points and very *giſt* of the indictment, and muſt be anſwered directly, by the general negative, Not guilty; and the jury upon the evidence will take notice of any defenſive matter, and give their verdict accordingly as effectually as if it were or could be ſpecially pleaded. So that this is, upon all accounts, the moſt advantageous plea for the priſoner.

When the priſoner hath thus pleaded not guilty, *non culpabilis*, or *nient culpable:* which was formerly uſed to be abbreviated upon the minutes, thus, *Non* (or *nient*) *cul.* the clerk of the aſſize, or clerk of arraigns, on behalf of the crown, replies, that the priſoner is guilty, and that he is ready to prove him ſo. This is done by two monoſyllables in the ſame ſpirit of abbreviation, (*cul. prit.:* which ſignifies firſt that the priſoner is guilty, (*cul. culpable*, or *culpabilis*); and then that the king is ready to prove him ſo, (*prit*, *præſto ſum*, or *paratus*, *verificare*). By this replication the king and the priſoner are therefore at iſſue: for when the parties come to a fact which is affirmed on one ſide and denied on the other, then they are ſaid to be at iſſue in point of fact: which is evidently the caſe here, in the plea of *non cul.* by the priſoner; and the replication of *cul.* by the clerk.

How the courts came to expreſs a matter of this importance in ſo odd and obſcure a manner, can hardly be pronounced with certainty. It may perhaps, however, be accounted for by ſuppoſing, that theſe were at firſt ſhort notes, to help the memory of the clerk, and remind him what he was to reply; or elſe it was the ſhort method of taking down in court, upon the minutes, the replication and averment; *cul. prít:* which afterwards the ignorance of ſucceeding clerks adopted for the very words to be by them ſpoken (A).

But however it may have ariſen, the joining of iſſue ſeems to be clearly the meaning of this obſcure expreſſion; which has puzzled our moſt ingenious etymologiſts, and is commonly underſtood as if the clerk of the arraigns, immediately on plea pleaded, had fixed an opprobrious name on the priſoner, by aſking him, "*culprit*, how wilt thou be tried?" for immediately upon iſſue joined it is inquired of the priſoner, by what trial he will make his innocence appear. This form has at preſent reference to appeals and approvements only, wherein the appellee has his choice, either to try the accuſation by

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(A) Of this ignorance we may ſee daily inſtances, in the abuſe of two legal terms of ancient French: one the prologue to all proclamations, "*Oyez*, or Hear ye," which is generally pronounced, moſt unmeaningly, "O yes: the other, a more pardonable miſtake, viz. when a jury are all ſworn, the officer bids the crier number them, for which the word in law-French is, "*Countez;*" but we now hear it pronounced in very good Engliſh, "Count theſe."

BATTEL or by JURY. But upon indictments, ſince the abolition of ORDEAL, there can be no other trial but by jury, *per pais*, or by the country: and therefore, if the priſoner refuſes to put himſelf upon the inqueſt in the uſual form, that is, to anſwer that he will be tried by God and the country, if a commoner; and, if a peer, by God and his peers; the indictment, if in treaſon, is taken *pro confeſſo*; and the priſoner, in caſes of felony, is judged to ſtand mute, and, if he perſeveres in his obſtinacy, ſhall now be convicted of the felony.

When the priſoner has thus put himſelf upon his trial, the clerk anſwers in the humane language of the law, which always hopes that the party's innocence rather than his guilt may appear, "God ſend thee a good deliverance." And then they proceed, as ſoon as conveniently may be, to the trial. See the article TRIAL.

PLEADINGS, in *Law*, are the mutual altercations between the plaintiff and defendant, (ſee SUIT, WRIT, and PROCESS). They form the third part or ſtage of a ſuit; and at preſent are ſet down and delivered into the proper office in writing, though formerly they were uſually put in by their counſel *ore tenus*, or *viva voce*, in court, and then minuted down by the chief clerks or prothonotaries; whence, in our old law-French, the pleadings are frequently denominated the *parol*.

The firſt of theſe is the *declaration, narratio*, or *count*, anciently called the *tale;* in which the plaintiff ſets forth his cauſe of complaint at length: being indeed only an amplification or expoſition of the original writ upon which his action is founded, with the additional circumſtances of time and place, when and where, the injury was committed.

In *local* actions, where poſſeſſion of land is to be recovered, or damages for an actual treſpaſs, or for waſte, &c. affecting land, the plaintiff muſt lay his declaration, or declare his injury to have happened in the very county and place that it really did happen; but in *tranſitory* actions, for injuries that might have happened anywhere, as debt, detinue, ſlander, and the like, the plaintiff may declare in what county he pleaſes, and then the trial muſt be in that county in which the declaration is laid. Though, if the defendant will make affidavit that the cauſe of action, if any, aroſe not in that but another county, the court will direct a change of *the venue* or *viſne* (that is, the *vicinia* or neighbourhood in which the injury is declared to be done), and will oblige the plaintiff to declare in the proper county. For the ſtatute 6 Ric. II. c. 2. having ordered all writs to be laid in their proper counties, this, as the judges conceived, impowered them to change the *venue*, if required, and not to inſiſt rigidly on abating the writ: which practice began in the reign of James I. And this power is diſcretionally exerciſed, ſo as not to cauſe but prevent a defect of juſtice. Therefore the court will not change the *venue* to any of the four northern counties previous to the ſpring circuit; becauſe there the aſſiſes are holden only once a-year, at the time of ſummer circuit. And it will ſometimes remove the *venue* from the proper juriſdiction (eſpecially of the narrow and limited kind), upon a ſuggeſtion, duly ſupported, that a fair and impartial trial cannot be had therein.

It is generally uſual, in actions upon the caſe, to ſet forth ſeveral caſes, by different counts in the ſame declaration; ſo that if the plaintiff fails in the proof of one, he may ſucceed in another. As in an action on the caſe upon an ASSUMPSIT for goods ſold and delivered, the plaintiff uſually counts or declares, firſt, upon a ſettled and agreed price between him and the defendant; as, that they bargained for 20l.: and leſt he ſhould fail in the proof of this, he counts likewiſe upon a *quantum valebant;* that the defendant bought other goods, and agreed to pay him ſo much as they were reaſonably worth; and then avers that they were worth other 20l. and ſo on in three or four different ſhapes; and at laſt concludes with declaring, that the defendant had refuſed to fulfil any of theſe agreements, whereby he is endamaged to ſuch a value. And if he proves the caſe laid in any one of his counts, though he fails in the reſt, he ſhall recover proportionable damages. This declaration always concludes with theſe words, "and thereupon he brings ſuit," &c. *inde producit ſectam*, &c. By which words, *ſuit* or *ſecta* (*a ſequendo*), were anciently underſtood the witneſſes or followers of the plaintiff. For in former times, the law would not put the defendant to the trouble of anſwering the charge till the plaintiff had made out at leaſt a probable caſe. But the actual production of the *ſuit*, *ſecta*, or *followers*, is now antiquated, and hath been totally diſuſed, at leaſt ever ſince the reign of Edward III. though the form of it ſtill continues.

At the end of the declaration are added alſo the plaintiff's common pledges of proſecution, John Doe and Richard Roe; which, as we elſewhere obſerve, (ſee WRIT), are now mere names of form; though formerly they were of uſe to anſwer to the king for the amercement of the plaintiff, in caſe he were nonſuited, barred of his action, or had a verdict and judgment againſt him. For if the plaintiff neglects to deliver a declaration for two terms after the defendant appears, or is guilty of other delays or defaults againſt the rules of law in any ſubſequent ſtage of the action, he is adjudged not to follow or purſue his remedy as he ought to do; and thereupon a *nonſuit*, or *non proſequitur*, is entered, and he is ſaid to be *non-pros*'d. And for thus deſerting his complaint, after making a falſe claim or complaint (*pro falſo clamore ſuo*), he ſhall not only pay coſts to the defendant, but is liable to be amerced to the king. A *retraxit* differs from a nonſuit, in that the one is negative and the other poſitive: the nonſuit is a default and neglect of the plaintiff, and therefore he is allowed to begin his ſuit again upon payment of coſts; but a *retraxit* is an open and voluntary renunciation of his ſuit in court; and by this he for ever loſes his action. A *diſcontinuance* is ſomewhat ſimilar to a nonſuit; for when a plaintiff leaves a chaſm in the proceedings of his cauſe, as by not continuing the proceſs regularly from day to day, and time to time, as he ought to do, the ſuit is diſcontinued, and the defendant is no longer bound to attend; but the plaintiff muſt begin again, by ſuing out a new original, uſually paying coſts to his antagoniſt.

When the plaintiff hath ſtated his caſe in the declaration, it is incumbent on the defendant, within a reaſonable time, to make his defence, and put in a plea; or elſe the plaintiff will at once recover judgment by *default*, or *nihil dicit*, of the defendant.

Defence, in its true legal ſenſe, ſignifies not a juſtification, protection, or guard, which is now its popular ſignification; but merely an *oppoſing* or *denial* (from the French verb *defendre*) of the truth or validity of the complaint. It is the *conteſtatio litis* of the civilians: a general aſſertion that the plaintiff hath no ground of action; which aſſertion is afterward extended and maintained in his plea.

Before defence made, if at all, cognizance of the ſuit muſt be claimed or demanded; when any perſon or body-corporate hath the franchiſe, not only of holding pleas within a particular limited juriſdiction, but alſo of the cognizance of pleas; and that either without any words excluſive of other courts, which intitles the lord of the franchiſe, whenever any ſuit that belongs to his juriſdiction is commenced in the courts at Weſtminſter, to demand the cognizance thereof; or with ſuch excluſive words, which alſo intitle the defendant to plead to the juriſdiction of the court. Upon this claim of cognizance, if allowed, all proceedings ſhall ceaſe in the ſuperior court, and the plaintiff is left at liberty to purſue his remedy in the ſpecial juriſdiction. As, when a ſcholar or other privileged perſon of the univerſities of Oxford or Cambridge is impleaded in the courts at Weſtminſter, for any cauſe of action whatſoever, unleſs upon a queſtion of freehold. In theſe caſes, by the charter of thoſe learned bodies, confirmed by act of parliament, the chancellor, or vice-chancellor, may put in a claim of cognizance; which, if made in due time and form, and with due proof of the facts alleged, is regularly allowed by the courts. It muſt be demanded before full defence is made or imparlance prayed; for theſe are a ſubmiſſion to the juriſdiction of the ſuperior court, and the delay is a *laches* in the lord of the franchiſe: and it will not be allowed if it occaſions a failure of juſtice, or if an action be brought againſt the perſon himſelf who claims the franchiſe, unleſs he hath alſo a power in ſuch caſe of making another judge.

After defence made, the defendant muſt put in his plea. But before he defends, if the ſuit is commenced by *capias* or *latitat*, without any ſpecial original, he is intitled to demand one *imparlance*, or *licentia loquendi*; and may, before he pleads, have more granted by conſent of the court, to ſee if he can end the matter amicably without farther ſuit, by talking with the plaintiff: a practice which is ſuppoſed to have ariſen from a principle of religion, in obedience to that precept of the goſpel, "agree with thine adverſary quickly, whilſt thou art *in the way* with him." And it may be obſerved, that this goſpel-precept has a plain reference to the Roman law of the twelve tables, which expreſly directed the plaintiff and defendant to make up the matter while they were in the way, or going to the prætor;—*in via, rem uti pacent orato.* There are alſo many other previous ſteps which may be taken by a defendant before he puts in his plea. He may, in real actions, demand a view of the thing in queſtion, in order to aſcertain its identity and other circumſtances. He may crave *oyer* of the writ, or of the bond, or other ſpecialty upon which the action is brought; that is, to hear it read to him; the generality of defendants in the times of ancient ſimplicity being ſuppoſed incapable to read it themſelves: whereupon the whole is entered *verbatim* upon the record; and the defendant may take advantage of any condition, or other part of it, not ſtated in the plaintiff's declaration. In real actions alſo the tenant may pray in *aid*, or call for the aſſiſtance of another, to help him to plead, becauſe of the feebleneſs or imbecility of his own eſtate. Thus a tenant for life may pray in aid of him that hath the inheritance in remainder or reverſion; and an incumbent may pray in aid of the patron and ordinary; that is, that they ſhall be joined in the action, and help to defend the title. *Voucher* alſo is the calling in of ſome perſon to anſwer the action, that hath warranted the title to the tenant or defendant. This we ſtill make uſe of in the form of common recoveries, which are grounded on a writ of entry; a ſpecies of action that relies chiefly on the weakneſs of the tenant's title, who therefore vouches another perſon to warrant it. If the voucher appear, he is made defendant inſtead of the voucher; but if he afterwards makes default, recovery ſhall be had againſt the original defendant; and he ſhall recover an equivalent in value againſt the deficient vouchee. In aſſizes, indeed, where the principal queſtion is, whether the demandant or his anceſtors were or were not in poſſeſſion till the ouſter happened, and the title of the tenant is little (if at all) diſcuſſed, there no voucher is allowed; but the tenant may bring a writ of *warrantia chartæ* againſt the warranter, to compel him to aſſiſt him with a good plea or defence, or elſe to render damages and the value of the land, if recovered againſt the tenant. In many real actions alſo, brought by or againſt an infant under the age of 21 years, and alſo in actions of debt brought againſt him, as heir to any deceaſed anceſtor, either party may ſuggeſt the nonage of the infant, and pray that the proceedings may be deferred till his full age, or, in our legal phraſe, that the infant may have his age, and that the *parol may demur*, that is, that the pleadings may be ſtaid; and then they ſhall not proceed till his full age, unleſs it be apparent that he cannot be prejudiced thereby. But by the ſtatutes of Weſtm. 1. 3 Edw. I. c. 46. and of Gloceſter, 6 Edw. I. c. 2. in writs of entry *ſur diſſeiſin* in ſome particular caſes, and in actions auncestrel brought by an infant, the parol ſhall not demur; otherwiſe he might be deforced of his whole property, and even want a maintenance, till he came of age. So likewiſe in a writ of dower the heir ſhall not have his age; for it is neceſſary that the widow's claim be immediately determined, elſe ſhe may want a preſent ſubſiſtence. Nor ſhall an infant patron have it in a *quare impedit*, ſince the law holds it neceſſary and expedient that the church be immediately filled.

When theſe proceedings are over, the defendant muſt then put in his excuſe or plea. See Plea.

It is a rule in pleading, that no man be allowed to plead ſpecially ſuch a plea as amounts only to the general iſſue, or a total denial of the charge; but in ſuch caſe he ſhall be driven to plead the general iſſue in terms, whereby the whole queſtion is referred to a jury. But if the defendant, in an aſſize or action of treſpaſs, be deſirous to refer the validity of his title to the court rather than the jury, he may ſtate his title ſpecially; and at the ſame time give colour to the plaintiff, or ſuppoſe him to have an appearance or colour of title, bad indeed in point of law, but of which the jury are not competent judges. As if his own true title is, that he claims by feoffment with livery from A, by force of which he entered on the lands in queſtion, he cannot plead this by itſelf, as it amounts to no more than the general iſſue, *nul tort, nul diſſeiſin*, in aſſize, or *not guilty* in an action of treſpaſs. But he may allege this ſpecially, provided he goes farther, and ſays, that the plaintiff claiming by colour of a prior deed of feoffment, with-

Pleading.

out livery, entered; upon whom he entered; and may then refer himself to the judgement of the court which of these two titles is the best in point of law.

When the plea of the defendant is thus put in, if it does not amount to an issue or total contradiction of the declaration, but only evades it, the plaintiff may plead again, and reply to the defendant's plea: Either traversing it, that is, totally denying it; as, on an action of debt upon bond, the defendant pleads *solvit ad diem*, that he paid the money when due; here the plaintiff in his replication may totally traverse this plea, by denying that the defendant paid it: Or he may allege new matter in contradiction to the defendant's plea; as when the defendant pleads no award made, the plaintiff may reply, and set forth an actual award, and assign a breach: Or the replication may confess and avoid the plea, by some new matter or distinction, consistent with the plaintiff's former declaration; as in an action for trespassing upon land whereof the plaintiff is seized, if the defendant shows a title to the land by descent, and that therefore he had a right to enter, and gives colour to the plaintiff, the plaintiff may either traverse and totally deny the fact of the descent; or he may confess and avoid it, by replying, that true it is that such descent happened, but that since the descent the defendant himself demised the lands to the plaintiff for term of life. To the replication the defendant may *rejoin*, or put in an answer called a *rejoinder*. The plaintiff may answer the rejoinder by a *ſur-rejoinder;* upon which the defendant may *rebut*, and the plaintiff anſwer him by a *ſur-rebutter*. Which pleas, replications, rejoinders, ſur-rejoinders, rebutters, and ſur-rebutters, anſwer to the *exceptio, replicatio, duplicatio, triplicatio*, and *quadruplicatio*, of the Roman laws.

The whole of this proceſs is denominated the *pleading;* in the ſeveral ſtages of which it muſt be carefully obſerved, not to depart or vary from the title or defence which the party has once inſiſted on. For this (which is called a *departure* in pleading) might occaſion endleſs altercation. Therefore the replication muſt ſupport the declaration, and the rejoinder muſt ſupport the plea, without departing out of it. As in the caſe of pleading no award made in conſequence of a bond of arbitration, to which the plaintiff replies, ſetting forth an actual award; now the defendant cannot rejoin that he hath performed this award, for ſuch rejoinder would be an entire departure from his original plea, which alleged that no ſuch award was made: therefore he has now no other choice, but to traverſe the fact of the replication, or elſe to demur upon the law of it.

Again, all duplicity in pleading muſt be avoided. Every plea muſt be ſimple, entire, connected, and confined to one ſingle point: it muſt never be entangled with a variety of diſtinct independent anſwers to the ſame matter; which muſt require as many different replies, and introduce a multitude of iſſues upon one and the ſame diſpute. For this would often embarraſs the jury, and ſometimes the court itſelf, and at all events would greatly enhance the expence of the parties. Yet it frequently is expedient to plead in ſuch a manner as to avoid any implied admiſſion of a fact, which cannot with propriety or ſafety be poſitively affirmed or denied. And this may be done by what is called a *proteſtation;* whereby the party interpoſes an oblique allegation or denial of ſome fact, proteſting (by the gerund, *proteſtando*) that ſuch a matter does or does not exiſt: and at the ſame time avoiding a direct affirmation or denial. Sir Edward Coke hath defined a proteſtation (in the pithy dialect of that age) to be, "an excluſion of a concluſion." For the uſe of it is, to ſave the party from being concluded with reſpect to ſome fact or circumſtance which cannot be directly affirmed or denied without falling into duplicity of pleading; and which yet, if he did not thus enter his proteſt, he might be deemed to have tacitly waved or admitted. Thus, while tenure in villenage ſubſiſted, if a villain had brought an action againſt his lord, and the lord was inclined to try the merits of the demand, and at the ſame time to prevent any concluſion againſt himſelf that he had waved his ſigniory; he could not in this caſe both plead affirmatively that the plaintiff was his villain, and alſo take iſſue upon the demand; for then his plea would have been double, as the former alone would have been a good bar to the action: but he might have alleged the villainage of the plaintiff by way of proteſtation, and then have denied the demand. By this means the future vaſſalage of the plaintiff was ſaved to the defendant, in caſe the iſſue was found in his (the defendant's) favour; for the proteſtation prevented that concluſion which would otherwiſe have reſulted from the reſt of his defence, that he had enfranchiſed the plaintiff, ſince no villain could maintain a civil action againſt his lord. So alſo if a defendant, by way of inducement to the point of his defence, alleges (among other matters) a particular mode of ſeiſin or tenure which the plaintiff is unwilling to admit, and yet deſires to take iſſue on the principal point of the defence, he muſt deny the ſeiſin or tenure by way of proteſtation, and then traverſe the defenſive matter. So, laſtly, if an award be ſet forth by the plaintiff, and he can aſſign a breach in one part of it (viz. the non-payment of a ſum of money), and yet is afraid to admit the performance of the reſt of the award, or to aver in general a non-performance of any part of it, leſt ſomething ſhould appear to have been performed; he may ſave to himſelf any advantage he might hereafter make of the general non-performance, by alleging that by proteſtation, he can plead only the non-payment of the money.

In any ſtage of the pleadings, when either ſide advances or affirms any new matter, he uſually (as was ſaid) avers it to be true; "and this he is ready to verify." On the other hand, when either ſide traverſes or denies the facts pleaded by his antagoniſt, he uſually tenders an *iſſue*, as it is called; the language of which is different according to the party by whom it is tendered: for if the traverſe or denial comes from the defendant, the iſſue is tendered in this manner, "And of this he puts himſelf upon the country," thereby ſubmitting himſelf to the judgement of his peers: but if the traverſe lies upon the plaintiff, he tenders the iſſue or prays the judgement of the peers againſt the defendant in another form; thus, "and this he prays may be inquired of by the country."

But if either ſide (as, for inſtance, the defendant) pleads a ſpecial negative plea, not traverſing or denying any thing that was before alleged, but diſcloſing ſome new negative matter; as where the ſuit is on a bond, conditioned to perform an award, and the defendant pleads, negatively, that no award was made; he tenders no iſſue upon this plea, becauſe it does not yet appear whether the fact will be diſputed, the plaintiff not having yet aſſerted the exiſtence of any award: but when the plaintiff replies, and ſets forth an actual ſpecific award, if then the defendant traverſes the replication, and denies the making of any ſuch award, he then, and not before, tenders an iſſue to the plaintiff. For when in the courſe of pleading they come to a point which is affirmed on one ſide and denied on the other, they are then ſaid to be at iſſue; all their debates being at laſt contracted into a ſingle point, which muſt now be determined either in favour of the plaintiff or of the defendant. See Issue.

PLEASING, art of. See Politeness.

PLEASURE is a word ſo univerſally underſtood as to need no explanation. Lexicographers, however, who muſt attempt to explain every word, call it "the gratification of the mind or ſenſes." It is directly oppoſite to Pain, and conſtitutes the whole of poſitive happineſs, as that does of miſery.

The Author of Nature has furniſhed us with many pleaſures, as well as made us liable to many pains; and we are ſuſceptible of both in ſome degree as ſoon as we have life and are endowed with the faculty of ſenſation. A French writer, in a work * which once raiſed high expectations, contends, that a child in the womb of its mother feels neither pleaſure nor pain. "Theſe ſenſations (ſays he) are not innate; they have their origin from without; and it is at the moment of our birth that the ſoul receives the firſt impreſſions; impreſſions ſlight and ſuperficial at the beginning, but which by time and repeated acts leave deeper traces in the ſenſorium, and become more extenſive and more laſting. It is when the child ſends forth its firſt cries that ſenſibility or the faculty of ſenſation is produced, which in a ſhort time gathers ſtrength and ſtability by the impreſſion of exterior objects. Pleaſure and pain not being innate, and being only acquired in the ſame manner as the qualities which we derive from inſtruction, education, and ſociety, it follows that we learn to ſuffer and enjoy as we learn any other ſcience."

This is ſtrange reaſoning and ſtrange language. That ſenſations are not innate is univerſally acknowledged; but it does not therefore follow that the ſoul receives its firſt impreſſions and firſt ſenſations at the moment of birth. The child has life, the power of locomotion, and the ſenſe of touch, long before it is born; and every mother will tell this philoſopher, that an infant unborn exhibits ſymptoms both of pain and of pleaſure. That many of our organs of ſenſe are improved by uſe is incontrovertible; but it is ſo far from being true that our ſenſible pleaſures become more exquiſite by being often repeated, that the direct contrary is experienced of far the greater part of them; and though external objects, by making repeated impreſſions on the ſenſes, certainly leave deeper traces on the memory than an object once perceived can do, it by no means follows that theſe impreſſions become the more delightful the more familiar that they are to us. That we learn to ſuffer and enjoy as we learn any other ſcience, is a moſt extravagant paradox; for it is ſelf-evident that we cannot live without being capable in ſome degree both of ſuffering and enjoyment, though a man may certainly live to old age in profound ignorance of all the ſciences.

The ſame writer aſſures us, indeed, that ſenſation is not neceſſary to human life. "Philoſophers (ſays he) make mention of a man who had loſt every kind of feeling in every member of his body: he was pinched or pricked to no purpoſe. Meanwhile this man made uſe of all his members; he walked without pain, he drank, ate, and ſlept, without perceiving that he did ſo. Senſible neither to pleaſure nor pain, he was a true natural machine."

To the tale of theſe anonymous philoſophers our author gives implicit credit, whilſt he favours us at the ſame inſtant with the following argumentation, which completely proves its falſehood. "It is true that ſenſation is a relative quality, ſuſceptible of increaſe and diminution; that it is not neceſſary to exiſtence; and that one might live without it: but in this caſe he would live as an automaton, without feeling pleaſure or pain; and he would poſſeſs neither idea, nor reflection, nor deſire, nor paſſion, nor will, nor ſentiment; his exiſtence would be merely paſſive, he would live without knowing it, and die without apprehenſion."

But if this man of the philoſophers, whom our author calls an *automaton*, and a *true natural machine*, had neither *idea*, nor *deſire*, nor *paſſion*, nor *will*, nor *ſentiment* (and without ſenſation he certainly could have none of them), what induced him to *walk*, *eat*, or *drink*, or to *ceaſe* from any of theſe operations after they were accidentally begun? The inſtances of the *automata* which played on the flute and at cheſs are not to the purpoſe for which they are adduced; for there is no parallel between them and this natural machine, unleſs the philoſophers wound up their man to eat, drink, walk, or ſit, as Vacanſon and Kempeler wound up their automata to play or ceaſe from playing on the German flute and at cheſs. See Androides.

Our author having for a while ſported with theſe harmleſs paradoxes, proceeds to put the credulity of his reader to the teſt with others of a very contrary tendency. He inſtitutes an inquiry concerning the ſuperiority, in number, and degree, of the pleaſures enjoyed by the different orders of men in ſociety; and labours, not indeed by argument, but by looſe declamation, to propagate the belief that happineſs is very unequally diſtributed. The pleaſures of the rich, he ſays, muſt be more numerous and exquiſite than thoſe of the poor; the nobleman muſt have more enjoyments than the plebeian of equal wealth; and the king, according to him, muſt be the happieſt of all men. He owns, indeed, that although "birth, rank, honours, and dignity, add to happineſs, a man is not to be conſidered as miſerable becauſe he is born in the lower conditions of life. A man may be happy as a mechanic, a merchant, or a labourer, provided he enters into the ſpirit of his profeſſion, and has not imbibed by a miſplaced education thoſe ſentiments which make his condition inſupportable. Happineſs is of eaſy acquiſition in the middling ſtations of life; and though perhaps we are unable to know or to rate exactly the pleaſure which ariſes from contentment and mediocrity, yet happineſs being a kind of aggregate of delights, of riches, and of advantages more or leſs great, every perſon muſt have a ſhare of it; the diviſion is not exactly made, but all other things equal, there will be more in the elevated than in the inferior conditions of ſociety; the enjoyment will be more felt, the means of enjoying more multiplied, and the pleaſures more varied. Birth, rank, fortune, talents, wit, genius, and virtue, are then the great ſources of happineſs: thoſe advantages are ſo conſiderable, that we ſee men contented with any one of them, but their union forms ſupreme felicity.

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* *Encyclopedie Methodique, Logique, Metaphyſique, et Morale*, tom. iv.

" There is ſo vaſt a difference, ſays Voltaire, between a man who has made his fortune and one who has to make it, that they are ſcarcely to be conſidered as creatures of the ſame kind. The ſame thing may be ſaid of birth, the greateſt of all advantages in a large ſociety; of rank, of honours, and of great abilities. How great a difference is made between a perſon of high birth and a tradeſman; between a Newton or Deſcartes and a ſimple mathematician? Ten thouſand ſoldiers are killed on the field of battle, and it is ſcarcely mentioned; but if the general fall, and eſpecially if he be a man of courage and abilities, the court and city are filled with the news of his death, and the mourning is univerſal.

" Frederick the Great, king of Pruſſia, felt in a more lively manner than perhaps any other man the value of great talents. I would willingly renounce, ſaid he to Voltaire, every thing which is an object of deſire and ambition to man; but I am certain if I were not a prince I ſhould be nothing. Your merit alone would gain you the eſteem, and envy, and admiration of the world; but to ſecure reſpect for me, titles, and armies, and revenues, are abſolutely neceſſary."

For what purpoſe this account of human happineſs was publiſhed, it becomes not us to ſay. Its obvious tendency is to make the lower orders of ſociety diſcontented with their ſtate, and envious of their ſuperiors; and it is not unreaſonable to ſuppoſe, that it contributed in ſome degree to excite the ignorant part of the author's countrymen to the commiſſion of thoſe atrocities of which they have ſince been guilty. That ſuch was his intention, the following extract will not permit us to believe; for though in it the author attempts to ſupport the ſame falſe theory of human happineſs, he mentions virtuous kings with the reſpect becoming a loyal ſubject of the unfortunate Louis, whoſe character he ſeems to have intentionally drawn, and whoſe death by the authority of a ſavage faction he has in effect foretold.

" Happineſs, in a ſtate of ſociety, takes the moſt variable forms: it is a Proteus ſuſceptible of every kind of metamorphoſis: it is different in different men, in different ages, and in different conditions, &c. The pleaſures of youth are very different from thoſe of old age: what affords enjoyment to a mechanic would be ſupreme miſery to a nobleman; and the amuſements of the country would appear inſipid in the capital. Is there then nothing fixed with regard to happineſs? Is it of all things the moſt variable and the moſt arbitrary? Or, in judging of it, is it impoſſible to find a ſtandard by which we can determine the limits of the greateſt good to which man can arrive in the preſent ſtate? It is evident that men form the ſame ideas of the beautiful and ſublime in nature, and of right and wrong in morality, provided they have arrived at that degree of improvement and civilization of which human nature is ſuſceptible: and that different opinions on theſe ſubjects depend on different degrees of culture, of education, and of improvement. The ſame thing may be advanced with regard to happineſs: all men, if equal with reſpect to their organs, would form the very ſame ideas on this ſubject if they reached the degree of improvement of which we are preſently ſpeaking; and in fact, do we not ſee in the great circles at Rome, at Vienna, at London, and Paris, that thoſe who are called people of faſhion, who have received the ſame education, have nearly the ſame taſte, the ſame deſires, and the ſame ſpirit for enjoyment? there is doubtleſs a certain degree of happineſs to be enjoyed in every condition of life; but as there are ſome conditions preferable to others, ſo are there degrees of happineſs greater and leſs; and if we were to form an idea of the greateſt poſſible in the preſent ſtate, it perhaps would be that of a ſovereign, maſter of a great empire, enjoying good health and a moderate ſpirit; endowed with piety and virtue; whoſe whole life was employed in acts of juſtice and mercy, and who governed by fixed and immoveable laws. Such a king is the image of the divinity on earth, and he muſt be the idol of a wiſe people. His whole life ſhould preſent a picture of the moſt auguſt felicity. Although ſuch ſovereigns are rare, yet we are not without examples of them. Ancient hiſtory affords us Titus and Marcus Aurelius, and the preſent age can boaſt of piety and munificence in the character of ſome of its kings. This ſtate of the greateſt happineſs to which man can reach not being ideal, it will ſerve as a ſtandard of compariſon by which happineſs and miſery can be eſtimated in all civilized countries. *He is as happy as a king*, is a proverbial expreſſion, becauſe we believe with juſtice that royalty is the extreme limit of the greateſt enjoyments; and in fact, happineſs being the work of man, that condition which comprehends all the degrees of power and of glory, which is the ſource of honour and of dignity, and which ſuppoſes in the perſon inveſted with it all means of enjoyment either for himſelf or others, leaves nothing on this earth to which any reaſonable man would give the preference.

" We can find alſo in this high rank the extreme of the greateſt evils to which the condition of nature is expoſed. A king condemned to death and periſhing on a ſcaffold, by the authority of a faction, while at the ſame time he had endeavoured by every means in his power to promote the general happineſs of his ſubjects, is the moſt terrible and ſtriking example of human miſery; for if it be true that a crown is the greateſt of all bleſſings, then the loſs of it, and at the ſame time the loſs of life by an ignominious and unjuſt ſentence, are of all calamities the moſt dreadful.

" It is alſo in the courts of kings that we find the moſt amiable and perfect characters: and it is there where true grandeur, true politeneſs, the beſt tone of manners, the moſt amiable graces, and the moſt eminent virtues, are completely eſtabliſhed. It is in courts that men ſeem to have acquired their greateſt improvement: Whoſoever has ſeen a court, ſays La Bruyere, has ſeen the world in the moſt beautiful, the moſt enchanting, and attractive colours. The prejudices of mankind in behalf of the great are ſo exceſſive, that if they inclined to be good they would be almoſt the objects of adoration."

In this paſſage there are doubtleſs many juſt obſervations; but there is at leaſt an equal number of others both falſe and dangerous. That a crown is the greateſt of earthly bleſſings, and that it is in the courts of kings that we meet with the moſt amiable and perfect characters, are poſitions which a true philoſopher will not admit but with great limitations. The falſehood of the author's general theory reſpecting the unequal diſtribution of happineſs in ſociety, we need not waſte time in expoſing. It is ſufficiently expoſed in other articles of this work, and in one of them by a writer of a very ſuperior order (See HAPPINESS; and *MORAL Philoſophy*, Part II. chap. ii.). He enters upon other ſpeculations reſpecting the pleaſures and pains of ſavages, which are ingenious and worthy of attention; but before we proceed to notice them, it will be proper to conſider the connection which ſubſiſts between pleaſure and pain.

“ That the ceſſation of pain is accompanied by pleaſure, is a fact (ſays a philoſopher of the firſt rank †) which has been repeatedly obſerved, but perhaps not ſufficiently accounted for. Let us ſuppoſe a perſon in a ſtate of indifference as to heat. Upon coming near a fire, he will experience at firſt an agreeable warmth, i. e. pleaſure. If the heat be increaſed, this ſtate of pleaſure will, after a time, be converted into one of pain, from the increaſed action upon the nerves and brain, the undoubted organs of all bodily ſenſations. Let the heat now be gradually withdrawn, the nervous ſyſtem muſt acquire again, during this removal, the ſtate of agreeable warmth or pleaſure; and after paſſing through that ſtate it will arrive at indifference. From this fact then we may conclude, that a ſtate of pleaſure may be puſhed on till it is converted into one of pain; and, on the other hand, that an action which produces pain will, if it go off gradually, induce at a certain period of its decreaſe a ſtate of pleaſure. The ſame reaſoning which has thus been applied to the body may be extended alſo to the mind. Total languor of mind is not ſo pleaſant as a certain degree of action or emotion; and emotions pleaſant at one period may be increaſed till they become painful at another; whilſt painful emotions, as they gradually expire, will, at a certain period of their decreaſe, induce a ſtate of pleaſure. Hence then we are able to explain why pleaſure ſhould ariſe in all caſes from the gradual ceſſation of any action or emotion which produces pain.”

The ſame author maintains, that from the mere removal of pain, whether by degrees or inſtantaneouſly, we always experience pleaſure; and if the pain removed was exquiſite, what he maintains is certainly true. To account for this phenomenon he lays down the following law of nature, which experience abundantly confirms, viz. “ that the temporary withdrawing of any action from the body or mind invariably renders them more ſuſceptible of that action when again produced.” Thus, after long faſting, the body is more ſuſceptible of the effects of food than if the ſtomach had been lately ſatisfied; the action of ſtrong liquors is found to be greater on thoſe who uſe them ſeldom than on ſuch as are in the habit of drinking them. Thus, too, with reſpect to the mind; if a perſon be deprived for a time of his friend's ſociety, or of a favourite amuſement, the next viſit of his friend, or the next renewal of his amuſement, is attended with much more pleaſure than if they had never been withheld from him.

“ To apply this law to the caſe of a perſon ſuddenly relieved from acute pain. While he labours with ſuch pain, his mind is ſo totally occupied by it, that he is unable to attend to his cuſtomary purſuits or amuſements. He becomes therefore ſo much more ſuſceptible of their action, that when they are again preſented to him, he is raiſed above his uſual indifference to poſitive pleaſure. But all pains do not proceed from an exceſs of action. Many of them ariſe from reducing the body or the mind to a ſtate below indifference. Thus, if a perſon have juſt ſufficient warmth in his body to keep him barely at eaſe or in a ſtate of indifference, by withdrawing this heat a ſtate of uneaſineſs or pain is produced; and if in a calm ſtate of mind one be made acquainted with a melancholy event, his quiet is interrupted, and he ſinks below indifference into a painful ſtate of mind. If now, without communicating any new ſource of poſitive pleaſure, we remove in the former caſe the cold, and in the latter the grief, the perſons from whom they are removed will experience real pleaſure. Thus, then, whether pain ariſes from exceſs or deficiency of action, the gradual or the ſudden removal of it muſt be in all caſes attended with pleaſure *.” It is equally true that the gradual or ſudden removal of pleaſure is attended with pain.

We are now prepared to examine our French author's account of the pleaſures and pains of ſavages. “ Every age (ſays he) has its different pleaſures; but if we were to imagine that thoſe of childhood are equal to thoſe of confirmed age, we ſhould be much miſtaken in our eſtimation of happineſs. The pleaſures of philoſophy, either natural or moral, are not unfolded to the infant; the moſt perfect muſic is a vain noiſe; the moſt exquiſite perfumes and diſhes highly ſeaſoned offend his young organs inſtead of affording delight; his touch is imperfect; forty days elapſe before the child gives any ſign of laughter or of weeping; his cries and groans before that period are not accompanied with tears; his countenance expreſſes no paſſion; the parts of his face bear no relation to the ſentiments of the ſoul, and are moreover without conſiſtency. Children are but little affected with cold; whether it be that they feel leſs, or that the interior heat is greater than in adults. In them all the impreſſions of pleaſure and pain are tranſitory; their memory has ſcarcely begun to unfold its powers; they enjoy nothing but the preſent moment; they weep, laugh, and give tones of ſatisfaction without conſciouſneſs, or at leaſt without reflection; their joy is confined to the indulgence of their little whims, and conſtraint is the greateſt of their misfortunes; few things amuſe, and nothing ſatisfies them. In this happy condition of early infancy nature is at the whole expence of happineſs; and the only point is not to contradict her. What deſires have children? Give them liberty in all their movements, and they have a plenitude of exiſtence, an abundance of that kind of happineſs which is confined in ſome ſort to all the objects which ſurround them: but if all beings were happy on the ſame conditions, ſociety would be at no expence in procuring the happineſs of the different individuals who compoſe it. Senſation is the foundation of reflection; it is the principal attribute of the ſoul; it is by this that man is elevated to ſublime ſpeculations, and ſecures his dominion over nature and himſelf. This quality is not ſtationary, but ſuſceptible, like all other relative qualities, of increaſe and decay, of different degrees of ſtrength and intenſeneſs: it is different in different men; and in the ſame man it increaſes from infancy to youth, from youth to confirmed manhood: at this period it ſtops, and gradually declines as we proceed to old age and to ſecond childiſhneſs. Conſidered phyſically, it varies according to age, conſtitution, climate, and food; conſidered in a moral point

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† Dr Sayers.

* *Diſquiſitions Metaphyſical and Literary.*

of view, it takes its different appearances from individual education, and from the habits of ſociety; for man in a ſtate of nature and ſociety, with regard to ſenſation and the unfolding of his powers, may be conſidered as two diſtinct beings; and if one were to make a calculation of pleaſure in the courſe of human life, a man of fortune and capacity enjoys more than ten thouſand ſavages.

" Pleaſure and pain being relative qualities, they may be almoſt annihilated in the moment of vehement paſſion. In the heat of battle, for example, ardent and animated ſpirits have not felt the pain of their wounds; and minds ſtrongly penetrated with ſentiments of religion, enthuſiaſm, and humanity, have ſupported the moſt cruel torments with courage and fortitude. The ſenſibility of ſome perſons is ſo exquiſitely alive, that one can ſcarcely approach them without throwing them into convulſions. Many diſeaſes ſhow the effect of ſenſibility puſhed to an extreme; ſuch as hyſteric affections, certain kinds of madneſs, and ſome of thoſe which proceed from poiſon, and from the bite or ſting of certain animals, as the viper and the tarantula. Exceſſive joy or grief, fear and terror, have been known to deſtroy all ſenſation, and occaſion death (A)."

Having made theſe preliminary obſervations on pleaſure and pain in infancy, and as they are increaſed or diminiſhed by education, and the different conditions of body and mind, our author proceeds to conſider the capability of ſavages to feel pleaſure and pain " By ſavages he underſtands all the tribes of men who live by hunting and fiſhing, and on thoſe things which the earth yields without cultivation. Thoſe tribes who poſſeſs herds of cattle, and who derive their ſubſiſtence from ſuch poſſeſſions, are not to be conſidered as ſavages, as they have ſome idea of property. Some ſavages are naturally compaſſionate and humane, others are cruel and ſanguinary. Although the phyſical conſtitution of man be everywhere the ſame, yet the varieties of climate, the abundance or ſcarcity of natural productions, have a powerful influence to determine the inclinations. Even the fierceneſs of the tiger is ſoftened under a mild ſky; now nature forms the manners of ſavages juſt as ſociety and civil inſtitutions form the manners of civilized life. In the one caſe climate and food produce almoſt the whole effect; in the other they have ſcarcely any influence. The habits of ſociety every moment contend with nature, and they are almoſt always victorious. The ſavage devotes himſelf to the dominion of his paſſions; the civilized man is employed in reſtraining, in directing, and in modifying them: ſo much influence have government, laws, ſociety, and the fear of cenſure and puniſhment, over his ſoul.

" It is not to be doubted that ſavages are ſuſceptible both of pleaſure and pain; but are the impreſſions made on their organs as ſenſible, or do they feel pain in the ſame degree with the inhabitants of a civilized country?

" Their enjoyments are ſo limited, that if we confine ourſelves to truth, a few lines will be ſufficient to deſcribe them: our attention muſt therefore be confined to pain, becauſe the manner in which they ſupport misfortune, and even torture, preſents us with a view of character unequalled in the hiſtory of civilized nations. It is not uncommon in civilized countries to ſee men braving death, meeting it with cheerfulneſs, and even not uttering complaints under the torture; but they do not inſult the executioners of public vengeance, and defy pain in order to augment their torments; and thoſe who are condemned by the laws ſuffer the puniſhment with different degrees of fortitude. On thoſe mournful occaſions, the common ranks of mankind in general die with leſs firmneſs: thoſe, on the other hand, who have received education, and who, by a train of unfortunate events, are brought to the ſcaffold, whether it be the fear of being reproached with cowardice, or the conſideration that the ſtroke is inevitable, ſuch men diſcover the expiring ſighs of ſelf-love even in their laſt moments; and thoſe eſpecially of high rank, from their manners and ſentiments, are expected to meet death with magnanimity: but an American ſavage in the moment of puniſhment appears to be more than human; he is a hero of the firſt order, who braves his tormentors, who provokes them to employ all their art, and who conſiders as his chief glory to bear the greateſt degree of pain without ſhrinking (ſee America, N° 14, 27, 28, 29.). The recital of their tortures would appear exaggerated, if it were not atteſted by the beſt authority, and if the ſavage nations among whom thoſe cuſtoms are eſtabliſhed were not ſufficiently known; but the exceſs of the cruelty is not ſo aſtoniſhing as the courage of the victim. The European expoſed to ſufferings of the ſame dreadful nature would rend heaven and earth with his piercing cries and horrible groans; the reward of martyrdom, the proſpect of eternal life, could alone give him fortitude to endure ſuch torments; but the ſavage is not animated with this exalted hope. What ſupports him then in ſcenes of ſo exquiſite ſuffering? The feeling of ſhame, the fear of bringing reproach on his tribe, and giving a ſtain to his fellows never to be wiped away, are the only ſentiments which influence the mind of a ſavage, and which always preſent to his imagination, animate him, ſupport him, and lend him ſpirit and reſolution. At the ſame time, however powerful thoſe motives may be, they would not be alone ſufficient, if the

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(A) There are inſtances of perſons who have died at the noiſe of thunder without being touched. A man frightened with the fall of a gallery in which he happened to be, was immediately ſeized with the black jaundice. M. le Cat mentions a young perſon on whom the inſolence of another made ſuch an impreſſion, that his countenance became at firſt yellow, and then changed into black, in ſuch a manner that in leſs than eight days he appeared to wear a maſk of black velvet: he continued in this ſtate for four months, without any other ſymptom of bad health or any pain. A ſailor was ſo terrified in a ſtorm, that his face ſweated blood, which like ordinary ſweat returned as it was wiped off. Stahl, whoſe teſtimony cannot be called in queſtion, cites a ſimilar [illegible] of a girl who had been frightened with ſoldiers. The exceſs of fear, according to many phyſicians, produces madneſs and epilepſy.

Pleaſure.

the ſavage felt pain in the ſame degree with the European. Senſibility, as we have already obſerved, is increaſed by education; it is influenced by ſociety, manners, laws, and government; climate and food work it into a hundred different ſhapes; and all the phyſical and moral cauſes contribute to increaſe and diminiſh it. The habitual exiſtence of a ſavage would be a ſtate of ſuffering to an inhabitant of Europe. You muſt cut the fleſh of the one and tear it away with your nails, before you can make him feel in an equal degree to a ſcratch or prick of a needle in the other. The ſavage, doubtleſs, ſuffers under torture, but he ſuffers much leſs than an European in the ſame circumſtances: the reaſon is obvious; the air which the ſavages breathe is loaded with fog and moiſt vapours; their rivers not being confined by high banks, are by the winds as well as in floods ſpread over the level fields, and depoſit on them a putrid and pernicious ſlime; the trees ſqueezed one upon another, in that rude and uncultivated country ſerve rather as a covering to the earth than an ornament. Inſtead of thoſe freſh and delicious ſhades, thoſe openings in the woods, and walks croſſing each other in all directions, which delight the traveller in the fine foreſts of France and Germany; thoſe in America ſerve only to intercept the rays of the ſun, and to prevent the benign influence of his beams. The ſavage participates of this cold humidity; his blood has little heat, his humours are groſs, and his conſtitution phlegmatic. To the powerful influence of climate, it is neceſſary to join the habits of his life. Obliged to traverſe vaſt deſerts for ſubſiſtence, his body is accuſtomed to fatigue; food not nouriſhing, and at the ſame time in no great plenty, blunts his feelings; and all the hardſhips of the ſavage ſtate give a rigidity to his members which makes him almoſt incapable of ſuffering. The ſavage in this ſtate of nature may be compared to our water-women and ſtreet-porters, who, though they poſſeſs neither great vigour nor ſtrength, are capable of performing daily, and without complaint, that kind of labour which to a man in a different condition of life would be a painful and grievous burden. Feeling, in leſs perfection with the ſavage, by the effects of climate and food, and the habits of his life, is ſtill farther reſtrained by moral conſiderations. The European is leſs a man of nature than of ſociety: moral reſtraints are powerful with him; while over the American they have ſcarcely any influence. This latter then is in a double condition of imperfection with regard to us; his ſenſes are blunted, and his moral powers are not diſcloſed. Now, pleaſure and pain depending on the perfection of the ſenſes and the unfolding of the intellectual faculties, it cannot be doubted, that in enjoyments of any kind ſavages experience leſs pleaſure, and in their ſuffering leſs pain, than Europeans in the ſame circumſtances. And in fact, the ſavages of America poſſeſs a very feeble conſtitution. They are agile without being ſtrong; and this agility depends more on their habits than on the perfection of their members: they owe it to the neceſſity of hunting; and they are moreover ſo weak, that they were unable to bear the toil which their firſt oppreſſors impoſed on them. Hence a race of men in all reſpects ſo imperfect could not endure torment under which the moſt robuſt European would ſink, if the pain which they feel were really as great as it appears to be. Feeling is then, and muſt neceſſarily be, leſs in the ſavage condition; for this faculty diſcloſing itſelf by the exerciſe of all the phyſical and moral qualities, muſt be leſs as they are leſs exerciſed. Every thing ſhows the imperfection of this precious quality, this ſource of all our affections, in the American ſavages.

Pleaſure.

"All the improvements in Europe have had a tendency to unfold ſenſibility: the air is purified that we may breathe more freely; the moraſſes are drained, the rivers are regulated in their courſes, the food is nouriſhing, and the houſes commodious. With the ſavages, on the contrary, every thing tends to curb it; they take pleaſure even in hardening the organs of the body, in accuſtoming themſelves to bear by degrees the moſt acute pain without complaining. Boys and girls among the ſavages amuſe themſelves with tying their naked arms together, and laying a kindled coal between them, to try which of them can longeſt ſuffer the heat; and the warriors who aſpire to the honour of being chief, undergo a courſe of ſuffering which exceeds the idea of torture inflicted on the greateſt criminals in Europe."

Theſe obſervations on the pleaſures and pains of ſavages appear to be well-founded, and, as the attentive reader will perceive, are perfectly agreeable to the theory of Dr Sayers. If indeed that theory be juſt, as we believe it to be, it will follow, that the few pleaſures of ſenſe which the American enjoys, he ought to enjoy more completely than any European, becauſe to him they recur but ſeldom. This may very poſſibly be the caſe; and certainly would be ſo, were not his fibres, by climate and the habits of his life, rendered more rigid than thoſe of the civilized part of the inhabitants of Europe. But if we agree with our author * in what he ſays of the pains and pleaſures of ſavages, we cannot admit, without many exceptions, his theory of the enjoyments of children. It is ſo far from being true, that few things amuſe, and that nothing ſatisfies them, that the direct contrary muſt have been obſerved by every man attentive to the operations of the infant mind, which is amuſed with every thing new, and often completely ſatisfied with the mereſt trifle. The pleaſures of philoſophy are not indeed unfolded to the infant; but it by no means follows that he does not enjoy his rattle and his drum as much as the philoſopher enjoys his teleſcope and air-pump; and if there be any truth in the ſcience of phyſiognomy, the happineſs of the former is much more pure and exquiſite than that of the latter. That the moſt perfect muſic is vain noiſe to an infant, is far from being ſelf-evident, unleſs the author confines the ſtate of infancy to a very few months; and we are not diſpoſed to believe, without better proof than we have yet received, that the reliſh of exquiſite perfumes and highly-ſeaſoned diſhes adds much to the ſum of human felicity.

But however much we diſapprove of many of theſe reflections, the following we cordially adopt as our own. "If we compare (ſays our author) the pleaſures of ſenſe with thoſe which are purely intellectual, we ſhall find that the latter are infinitely ſuperior to the former, as they may be enjoyed at all times and in every ſituation of life. What are the pleaſures of the table, ſays Cicero, of gaming, and of women, compared with the delights of ſtudy? This taſte increaſes with age, and no

happineſs

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* [illegible] thodique, [illegible] Morale, tom. iv.

happineſs is equal to it. Without knowledge and ſtudy, ſays Cato, life is almoſt the image of death (B). The power of the ſoul is ſuch, that it is frequent enough to ſee men preſerve their gaiety during their whole life, notwithſtanding a weak, diſeaſed, and debilitated body. Scarron, who lived in the laſt century, was an example of this. Balzac, ſpeaking of him, ſays, that Prometheus, Hercules, and Philoctetes, in fable, and Job in ſacred hiſtory, ſaid many great things while they were afflicted with violent pain; but Scarron alone ſaid pleaſant things. I have ſeen, continues he, in many places of ancient hiſtory, conſtancy, and modeſty, and wiſdom, and eloquence, accompanying affliction; but he is the only inſtance wherein I have ſeen pleaſantry.

" There are men whoſe underſtandings are conſtantly on the ſtretch, and by this very means they are improved: but if the body were as conſtantly employed in the purſuit of ſenſual gratification, the conſtitution would ſoon be deſtroyed. The more we employ the mind we are capable of the greater exertion; but the more we employ the body we require the greater repoſe. There are beſides but ſome organs of the body capable of enjoying pleaſure; every part of it can experience pain. A toothach occaſions more ſuffering than the moſt conſiderable of our pleaſures can procure of enjoyment. Great pain may continue for any length of time; exceſſive pleaſures are almoſt momentary. Pleaſure carried to an extreme becomes painful; but pain, either by augmenting or diminiſhing it, never becomes agreeable. For the moment, the pleaſures of the ſenſes are perhaps more ſatisfactory; but in point of duration thoſe of the heart and mind are infinitely preferable. All the ſentiments of tenderneſs, of friendſhip, of gratitude, and of generoſity, are ſources of enjoyment for man in a ſtate of civilization. The damned are exceedingly unhappy, ſaid St Catherine de Sienna, if they are incapable of loving or being beloved.

" Pleaſure, continued for a great length of time, produces languor and fatigue, and excites ſleep; the continuation of pain is productive of none of theſe effects. Many ſuffer pain for eight days and even a month without interruption; an equal duration of exceſſive pleaſure would occaſion death.

" Time is a mere relative idea with regard to pleaſure and pain; it appears long when we ſuffer, and ſhort when we enjoy. If there exiſted no regular and uniform movement in nature, we would not be able from our ſenſations alone to meaſure time with any degree of exactneſs, for pain lengthens and pleaſure abridges it. From the languor of unoccupied time has ariſen the proverbial expreſſion of our deſire to *kill* it. It is a melancholy reflection, and at the ſame time true, that there is no enjoyment which can effectually ſecure us from pain for the remainder of our lives; while there are examples of evils which hold men in conſtant ſorrow and pain during their whole exiſtence. Such then is the imperfection of the one and the power of the other.

" Pleaſure and pain are the ſources of morality; an action is juſt or unjuſt, good or otherwiſe, only as its natural tendency is to produce ſuffering or enjoyment to mankind. No crime could be committed againſt a being altogether inſenſible, nor could any good be beſtowed on it. Unleſs he were endowed with the deſire of pleaſure and the apprehenſion of pain, man, like an automaton, would act from neceſſity, without choice and without determination.

" All our paſſions are the developement of ſenſibility. If we were not poſſeſſed of feeling, we ſhould be deſtitute of paſſions; and as ſenſibility is augmented by civilization, the paſſions are multiplied; more active and vigorous in an extenſive and civilized empire than in a ſmall ſtate; more in the latter than among barbarous nations; and more in theſe laſt than among ſavages (ſee PASSION). There are more paſſions in France and England than in all the nations of Africa; becauſe every thing which ſerves to excite and foſter them is always in thoſe countries in the greateſt ſtate of fermentation. The mind is active; the ideas great, extenſive, and multiplied. And is it not the ſoul, the mind, and heart, which are the focus of all the paſſions?"

But wherever the paſſions are multiplied, the ſources of pleaſure and pain are multiplied with them. This being the caſe, it is impoſſible to preſcribe a fixed and general rule of happineſs ſuited to every individual. There are objects of pleaſure with regard to which all men of a certain education are agreed, but there are perhaps many more, owing to the variety of tempers and education, about which they differ. Every man forms ideas of enjoyment relative to his character; and what pleaſes one may be utterly deteſted by another. In proportion as a nation is civilized and extenſive, thoſe differences are remarkable. Savages, who are not acquainted with all the variety of European pleaſures, amuſe themſelves with very few objects. Owing to the want of civilization, they have ſcarcely any choice in the objects of taſte. They have few paſſions; we have many. But even in the nations of Europe pleaſure is infinitely varied in its modification and forms. Thoſe differences ariſe from manners, from governments, from political and religious cuſtoms, and chiefly from education. Meanwhile, however different and variable the ideas of pleaſure may be among nations and individuals, it ſtill remains a fact, that a certain number of perſons in all civilized ſtates, whether diſtinguiſhed by birth, or rank, or fortune, or talents, as they have nearly the ſame education ſo they form nearly the ſame ideas of happineſs: but to poſſeſs it a man muſt give his chief application to the ſtate of his mind; and notwithſtanding all his efforts it is of uncertain duration. Happineſs is the ſunſhine of life: we enjoy it frequently at great intervals; and it is therefore neceſſary to know how to uſe

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(B) " Savages, barbarians, and peaſants, enjoy little happineſs except that of ſenſation. The happineſs of a civilized and well-informed man conſiſts of ſenſations, of ideas, and of a great number of [illegible], altogether unknown to them. He not only enjoys the preſent, but the paſt and the future. He recals the agreeable idea of pleaſures which he has taſted. It is great happineſs, ſays an ancient, to have the recollection of good actions, of [illegible] intention, and of promiſes which we have kept."

Pleaſure || Pledge.

uſe it. All the productions of art periſh; the largeſt fortunes are diſſipated; rank, honour, and dignity paſs away like a fleeting ſhadow; the memory is impaired; all the faculties of the ſoul are extinguiſhed; the body ſinks under the infirmities of old age; and ſcarcely has one reached the boundaries of happineſs marked out by his imagination, when he muſt give place to another, and renounce all his pleaſures, all his hopes, all his illuſions; the fugitive images of which had given happineſs to the mind.

There are pleaſures, however, on which the mind may ſecurely reſt, which elevate man above himſelf, dignify his nature, fix his attention on ſpiritual things, and render him worthy of the care of Providence. Theſe are to be found in true religion; which procures for thoſe who practiſe its duties inexpreſſible happineſs in a better country, and is in this world the ſupport of the weak, and the ſweet conſolation of the unfortunate.

PLEBEIAN, any perſon of the rank of the common people. It is chiefly uſed in ſpeaking of the ancient Romans, who were divided into ſenators, patricians, and plebeians. The diſtinction was made by Romulus the founder of the city; who confined all dignities, civil, military, and ſacerdotal, to the rank of patricians. But to prevent the ſeditions which ſuch a diſtinction might produce through the pride of the higher order and the envy of the lower, he endeavoured to engage them to one another by reciprocal ties and obligations. Every plebeian was allowed to chooſe, out of the body of the patricians, a protector, who ſhould be obliged to aſſiſt him with his intereſt and ſubſtance, and to defend him from oppreſſion. Theſe protectors were called *patrons*; the protected, *clients*. It was the duty of the patron to draw up the contracts of the clients, to extricate them out of their difficulties and perplexities, and to guard their ignorance againſt the artfulneſs of the crafty. On the other hand, if the patron was poor, his clients were obliged to contribute to the portions of his daughters, the payment of his debts, and the ranſom of him and his children if they happened to be taken in war. The client and patron could neither accuſe nor bear witneſs againſt each other; and if either of them was convicted of having violated this law, the crime was equal to that of treaſon, and any one might with impunity ſlay the offender as a victim devoted to Pluto and the infernal gods. For more than 600 years we find no diſſenſions or jealouſies between the patrons and their clients; not even in the times of the republic, when the people frequently mutinied againſt the great and powerful.

PLECTRANTHUS, a genus of plants belonging to the didynamia claſs; and in the natural method ranking under the 42d order, *Verticillatæ*. See BOTANY *Index*.

PLEDGE (*Plegius*), in common law, a ſurety or gage, either real or perſonal, which the plaintiff or demandant is to find for his proſecuting the ſuit.

The word is ſometimes alſo uſed for *FRANK Pledge*, which ſee.

To PLEDGE, in drinking, denotes to warrant, or be ſurety to one, that he ſhall receive no harm while he is taking his draught. The phraſe is referred by antiquaries to the practice of the Danes heretofore in England, who frequently uſed to ſtab or cut the throats of the natives while they were drinking.

PLEDGES of Goods for money. See PAWN.

PLEDGERY, or PLEGGERY, in *Law*, ſuretiſhip, or an undertaking or anſwering for another.

PLEDGET, BOLSTER, or *Compreſs*, in *Surgery*, a kind of flat tent laid over a wound, to imbibe the ſuperfluous humours, and to keep it clean.

PLEIADES, in fabulous hiſtory, the ſeven daughters of Atlas king of Mauritania and Pleione, were thus called from their mother. They were Maia, Electra, Taygete, Aſterope, Merope, Halcyone, and Celœno; and were alſo called *Atlantides*, from their father Atlas. Theſe princeſſes were carried off by Buſiris king of Egypt; but Hercules having conquered him, delivered them to their father: yet they afterwards ſuffered a new perſecution from Orion, who purſued them five years, till Jove, being prevailed on by their prayers, took them up into the heavens, where they form the conſtellation which bears their name.

PLEIADES, in *Aſtronomy*, an aſſemblage of ſeven ſtars, in the neck of the conſtellation Taurus.

They are thus called from the Greek πλειν, *navigare*, "to ſail;" as being terrible to mariners, by reaſon of the rains and ſtorms that frequently riſe with them. The Latins called them *vergiliæ*, from *ver*, "ſpring;" becauſe of their riſing about the time of the vernal equinox. The largeſt is of the third magnitude, and is called *lucida pleiadum*.

PLENARY, ſomething complete or full. Thus we ſay the pope grants *plenary* indulgences; i. e. full and entire remiſſions of the penalties due to all ſins. See INDULGENCES.

PLENIPOTENTIARY, a perſon veſted with full power to do any thing. See AMBASSADOR.

PLENITUDE, the quality of a thing that is full, or that fills another. In medicine, it chiefly denotes a redundancy of blood and humours.

PLENUM, in *Phyſics*, denotes, according to the Carteſians, that ſtate of things wherein every part of ſpace is ſuppoſed to be full of matter, in oppoſition to a VACUUM, which is a ſpace ſuppoſed devoid of all matter.

PLENUS FLOS, a full flower; a term expreſſive of the higheſt degree of luxuriance in flowers. See BOTANY. Such flowers, although the moſt delightful to the eye, are both vegetable monſters, and, according to the ſexualiſts, vegetable eunuchs; the unnatural increaſe of the petals conſtituting the firſt; the conſequent excluſion of the ſtamina or male organs, the latter. The following are well-known examples of flowers with more petals than one; ranunculus, anemone, marſhmarygold, columbine, fennel-flower, poppy, pæony, pink, gilliflower, campion, viſcous campion, lily, crown imperial, tulip, narciſſus, rocket, mallow, Syrian mallow, apple, pear, peach, cherry, almond, myrtle, roſe, and ſtrawberry.

Flowers with one petal are not ſo ſubject to fullneſs. The following, however, are inſtances: polyanthus, hyacinth, primroſe, crocus, meadow-ſaffron, and thornapple; though Kramer has aſſerted that a full flower with one petal is a contradiction in terms. In flowers with one petal, the mode of luxuriance, or impletion, is by a multiplication of the diviſions of the limb or upper part; in flowers with more petals than one, by a multiplication of the petals or nectarium.

To take a few examples. Columbine is rendered full in three different ways: 1. By the multiplication of its petals, and total excluſion of the nectaria; 2. By the multiplication of the nectaria, and excluſion of the petals; or, 3. By ſuch an increaſe of the nectaria only as does not exclude the petals, between each of which are interjected three nectaria, placed one within another. Again, fennel-flower is rendered full by an increaſe of the nectaria only; narciſſus, either by a multiplication of its cup and petals, or of its cup only; larkſpur commonly by an increaſe of the petals and excluſion of the ſpur, which is its nectarium. In *ſaponaria concava anglia*, the impletion is attended with the ſingular effect of incorporating the petals, and reducing their number from five to one; and in gelder-roſe, the luxuriance is effected by an increaſe both in magnitude and number of the circumference or margin of the head of flowers, in the plain, wheel-ſhaped, barren florets; and an excluſion of all the bell-ſhaped hermaphrodite florets of the centre or diſk.

Hitherto we have treated of plenitude in ſimple flowers only: the inſtance juſt now adduced ſeems to connect the different modes of impletion in them and compound flowers. Before proceeding farther, however, it will not be improper to premiſe, that as a ſimple luxuriant flower is frequently, by beginners, miſtaken for a compound flower in a natural ſtate, ſuch flowers may always be diſtinguiſhed with certainty by this rule: That in ſimple flowers, however luxuriant, there is but one piſtillum or female organ; whereas in compound flowers, each floret, or partial flower, is furniſhed with its own proper piſtillum. Thus in hawk-weed, a compound flower, each flat or tongue-ſhaped floret in the aggregate has its five ſtamina and naked ſeed, which laſt is in effect its piſtillum; whereas, in a luxuriant lychnis, which is a ſimple flower, there is found only one piſtillum or female organ common to the whole.

In a compound radiated flower, which generally conſiſts of plain florets in the margin or radius, and tubular or hollow florets in the centre or diſc, plenitude is effected either by an increaſe of the florets in the margin, and a total excluſion of thoſe in the diſc; which mode of luxuriance is termed *impletion by the radius*, and reſembles what happens in the gelder-roſe: or by an elongation of the hollow florets in the centre, and a leſs profound diviſion of their brims; which is termed *impletion by the diſc*. In the firſt mode of luxuriance, the florets in the centre, which are always hermaphrodite or male, are entirely excluded; and in their place ſucceed florets ſimilar in ſex to thoſe of the radius. Now as the florets in the margin of a radiated compound flower are found to be always either female, that is, furniſhed with the piſtillum only; or neuter, that is, furniſhed with neither ſtamina nor piſtillum; it is evident, that a radiated compound flower, filled by the radius, will either be entirely female, as in feverfew, daiſy, and African marigold; or entirely neuter, as in ſun-flower, marygold, and centaury: hence it will always be eaſy to diſtinguiſh ſuch a luxuriant flower from a compound flower with plain florets in a natural ſtate; as theſe flowers are all hermaphrodite, that is, furniſhed with both ſtamina and piſtillum. Thus the full flowers of African marigold have each floret furniſhed with the piſtillum or female organ only: the natural flowers of dandelion, which, like the former, is compoſed of plain florets, are furniſhed with both ſtamina and piſtillum.

In the ſecond mode of luxuriance, termed *impletion by the diſc*, the florets in the margin ſometimes remain unchanged: but moſt commonly adopt the figure of thoſe in the centre, without, however, ſuffering any alteration in point of ſex; ſo that confuſion is leſs to be apprehended from this mode of luxuriance than from the former; beſides, the length to which the florets in the centre run out is of itſelf a ſufficient diſtinction, and adapted to excite at once an idea of luxuriance. Daiſy, feverfew, and African marigold, exhibit inſtances of this as well as of the former mode of impletion.

In luxuriant compound flowers with plain florets, the *ſemifloſculoſi* of Tournefort, the ſtigma or ſummit of the ſtyle in each floret is lengthened, and the ſeed-buds are enlarged and diverge; by which characters ſuch flowers may always be diſtinguiſhed from flowers of the ſame kind in a natural ſtate. Scorzonera, nipple-wort, and goat's-beard, furniſh frequent inſtances of the plenitude alluded to.

Laſtly, the impletion of compound flowers with tubular or hollow florets, the *floſculoſi* of Tournefort, ſeems to obſerve the ſame rules as that of radiated flowers juſt delivered. In everlaſting-flower, the *xeranthemum* of Linnæus, the impletion is ſingular, being effected by the enlargement and expanſion of the inward chaffy ſcales of the calyx. Theſe ſcales, which become coloured, are greatly augmented in length, ſo as to overtop the florets, which are ſcarce larger than thoſe of the ſame flower in a natural ſtate. The florets too in the margin, which in the natural flower are female, become, by luxuriance, barren; that is, are deprived of the piſtillum; the ſtyle, which was very ſhort, ſpreads, and is of the length of the chaffy ſcales; and its ſummits, formerly two in number, are metamorphoſed into one.

Full flowers are more eaſily referred to their reſpective genera in methods founded upon the calyx, as the flower-cup generally remains unaffected by this higheſt degree of luxuriance.

PLEONASM, a figure in *Rhetoric*, whereby we uſe words ſeemingly ſuperfluous, in order to expreſs a thought with the greater energy; ſuch as, "I ſaw it with my own eyes," &c. See ORATORY, Nº 67.

PLESCOW, a town of Ruſſia, capital of a duchy of the ſame name, with an archbiſhop's ſee, and a ſtrong caſtle. It is a large place, and divided into four parts, each of which is ſurrounded with walls. It is ſeated on the river Muldow, where it falls into the lake Pleſcow, 80 miles ſouth of Narva, and 150 ſouth by weſt of Peterſburg. E. Long. 27. 52. N. Lat. 57. 58.

PLESCOW, a duchy in Ruſſia, between the duchies of Novogorod, Lithuania, Livonia, and Ingria.

PLESSIS-LES-TOURS, formerly a royal palace of France, within half a league of Tours. It was built by Louis XI. and in it he died in the year 1483. It is ſituated in a plain ſurrounded by woods, at a ſmall diſtance from the Loire. The building is yet handſome, though built of brick, and converted to purpoſes of commerce.

PLETHORA, in *Medicine*, from πληθος, "plenitude." A plethora is when the veſſels are too much loaded with fluids. The plethora may be ſanguine or ſerous. In the firſt there is too much craſſamentum in the blood, in the latter too little. In the ſanguine plethora, there is danger of a fever, inflammation, apoplexy, rupture of the blood-veſſels, obſtructed ſecretions, &c.: in the or ſerous, of a dropſy, &c. A rarefaction of the blood produces all the effects of a plethora; it may accompany a plethora, and ſhou'd be diſtinguiſhed therefrom. Mr Bromfield obſerves, that a ſanguine plethora may thus be known to be preſent by the pulſe. An artery overcharged with blood is as incapable of producing a ſtrong full pulſe, as one that contains a deficient quantity; in both caſes there will be a low and weak pulſe. To diſtinguiſh rightly, the pulſe muſt not be felt with one or two fingers on the carpal artery; but if three or four fingers cover a conſiderable length of the artery, and we preſs hard for ſome time on it, and then ſuddenly raiſe all theſe fingers except that which is neareſt to the patient's hand, the influx of the blood, if there is a plethora, will be ſo rapid as to raiſe the other finger, and make us ſenſible of the fulneſs. The ſanguine plethora is relieved by bleeding: the ſerous by purging, diuretics, and ſweating. See MEDICINE *Index*.

PLEURA, in *Anatomy*, a thin membrane covering the inſide of the thorax. See ANATOMY *Index*.

PLEURITIS, or PLEURISY. See MEDICINE *Index*.

PLEURONECTES, a genus of fiſhes belonging to the order of thoracici. See ICHTHYOLOGY *Index*.

PLEURS, a town in France, which was buried under a mountain in the year 1618. Of this fatal circumſtance, Biſhop Burnet, in his Travels, p. 96. gives the following account. "Having mentioned (ſays the Biſhop) ſome falls of mountains in theſe parts (viz. near the Alps), I cannot paſs by the extraordinary fate of the town of Pleurs, about a league from Chavennes to the north.—The town was half the bigneſs of Chavennes, but much more nobly built; for, beſides the great palace of the Francken, that coſt ſome millions, there were many other palaces built by rich factors both of Milan and the other parts of Italy, who, liking the ſituation and air, as well as the freedom of the government, gave themſelves all the indulgences that a vaſt wealth could furniſh. By one of the palaces that was a little diſtant from the town, and was not overwhelmed with it, one may judge of the reſt. It was an out-houſe of the family of the Francken, and yet it may compare with many palaces in Italy. The voluptuouſneſs of this place became very crying; and Madame de Salis told me that ſhe heard her mother often relate ſome paſſages of a Proteſtant miniſter's ſermons that preached in a little church there, who warned them often of the terrible judgements of God which were hanging over their heads, and which he believed would ſuddenly break out upon them.

"On the 25th of Auguſt 1618, an inhabitant came and told me to be gone, for he ſaw the mountains cleaving; but he was laughed at for his pains. He had a daughter whom he perſuaded to leave all and go with him; but when ſhe was ſafe out of town, ſhe called to mind that ſhe had not locked the door of a room in which ſhe had ſome things of value, and ſo ſhe went back to do that, and was buried with the reſt; for at the hour of ſupper the hill fell down, and buried the town and all the inhabitants, to the number of 2200, ſo that not one perſon eſcaped. The fall of the mountains did ſo fill the channel of the river, that the firſt news thoſe of Chavennes had of it was by the failing of their river; for three or four hours there came not a drop of water, but the river wrought for itſelf a new courſe, and returned to them.

"I could hear no particular character of the man who eſcaped (continues the Biſhop); ſo I muſt leave the ſecret reaſon of ſo ſingular a preſervation to the great diſcovery, at the laſt day, of thoſe ſteps of Divine Providence that are now ſo unaccountable. Some of the family of the Francken got ſome miners to work under ground, to find out the wealth that was buried in their houſe; for, beſides their plate and furniture, there was a great deal of caſh and many jewels in the houſe. The miners pretended they could find nothing; but they went to their country of Tyrol and built fine houſes, and a great wealth appeared, of which no other viſible account could be given but this, that they had found ſome of that treaſure."

PLEXUS, among anatomiſts, a bundle of ſmall veſſels interwoven in the form of net work; thus a congeries of veſſels within the brain is called *plexus choroides*, *reticularis*, or *retiformis*. See ANATOMY.

A plexus of nerves is the union of two or more nerves, forming a ſort of ganglion or knot.

PLICA POLONICA, or *plaited hair*, is a diſeaſe peculiar to Poland; whence the name. See MEDICINE, Nº 355. Mr Coxe, who gives a ſhort account of it, attempts likewiſe to give the phyſical cauſes of it. Many cauſes of this kind, he tells us, have been ſuppoſed to concur in rendering the plica more frequent in thoſe regions than in other parts. It would be an endleſs work to enumerate the various conjectures with which each perſon has ſupported his favourite hypotheſis.—The moſt probable are thoſe aſſigned by Dr Vicat: The firſt cauſe is the nature of the Poliſh air, which is rendered inſalubrious by numerous woods and moraſſes, and occaſionally derives an uncommon keenneſs even in the midſt of ſummer from the poſition of the Carpathian mountains; for the ſouthern and ſouth-eaſterly winds, which uſually convey warmth in other regions, are in this chilled in their paſſage over their ſnowy ſummits. The ſecond is, unwholeſome water; for although Poland is not deficient in good ſprings, yet the common people uſually drink that which is neareſt at hand, taken indiſcriminately from rivers, lakes, and even ſtagnant pools. The third cauſe is the groſs inattention of the natives to cleanlineſs; for experience ſhows, that thoſe who are not negligent in their perſons and habitations, are leſs liable to be afflicted with the plica than others who are deficient in that particular. Thus perſons of higher rank are leſs ſubject to this diſorder than thoſe of inferior ſtations; the inhabitants of large towns than thoſe of ſmall villages; the free peaſants than thoſe in an abſolute ſtate of vaſſalage; the natives of Poland Proper than thoſe of Lithuania. Whatever we may determine as to the poſſibility that all or any of theſe cauſes, by themſelves, or in conjunction with others, originally produced the diſorder; we may venture to aſſert, that they all, and particularly the laſt, aſſiſt its propagation, inflame its ſymptoms, and protract its cure.

In a word, the plica polonica appears to be a contagious diſtemper; which, like the leproſy, ſtill prevails among a people ignorant in medicine, and inattentive to check its progreſs, but is rarely known in thoſe countries where proper precautions are taken to prevent its ſpreading.

PLIMPTON, a town of Devonſhire, in England, ſeated on a branch of the river Plime, which had once a caſtle, now in ruins. It ſends two members to parliament;

ment; is ſeven miles E. of Plymouth, and 218 W. by S. of London. W. Long. 4. 0. N. Lat. 50. 22.

PLINIA, a genus of plants belonging to the polyandria claſs of Linnæus. See BOTANY *Index*.

PLINTH, ORLE, or *Orlo*, in *Architecture*, a flat ſquare member, in the form of a brick. It is uſed as the foundation of columns, being that flat ſquare table under the moulding of the baſe and pedeſtal at the bottom of the whole order. It ſeems to have been originally intended to keep the bottom of the original wooden pillars from rotting. Vitruvius alſo calls the Tuſcan abacus *plinth*.

PLINTH of a Statue, &c. is a baſe, either flat, round, or ſquare, that ſerves to ſupport it.

PLINTH of a Wall, denotes two or three rows of bricks advancing out from a wall; or, in general, any flat high moulding, that ſerves in a front-wall to mark the floors, to ſuſtain the eaves of a wall, or the larmier of a chimney.

PLINY the ELDER, or *Cæcilius Plinius Secundus*, one of the moſt learned men of ancient Rome, was deſcended from an illuſtrious family, and born at Verona. He bore arms in a diſtinguiſhed poſt; was one of the college of augurs; became intendant of Spain; and was employed in ſeveral important affairs by Veſpaſian and Titus, who honoured him with their eſteem. The eruption of Mount Veſuvius, which happened in the year 79, proved fatal to him. His nephew, Pliny the Younger, relates the circumſtances of that dreadful eruption, and the death of his uncle, in a letter to Tacitus. Pliny the Elder wrote a Natural Hiſtory in 37 books, which is ſtill extant, and has had many editions; the moſt eſteemed of which is that of Father Hardouin, printed at Paris in 1723, in two volumes folio.

PLINY the Younger, nephew of the former, was born in the ninth year of Nero, and the 62d of Chriſt, at Novocomum, a town upon the lake Larius, near which he had ſeveral beautiful villas. Cæcilius was the name of his father, and Plinius Secundus that of his mother's brother, who adopted him. He brought into the world with him fine parts and an elegant taſte, which he did not fail to cultivate early; for, as he tells us himſelf, he wrote a Greek tragedy at 14 years of age. He loſt his father when he was young; and had the famous Virginius for his tutor or guardian, whom he has ſet in a glorious light. He frequented the ſchools of the rhetoricians, and heard Quintilian; for whom he ever after entertained ſo high an eſteem, that he beſtowed a conſiderable portion upon his daughter at her marriage. He was in his 18th year when his uncle died; and it was then that he began to plead in the forum, which was the uſual road to dignities. About a year after, he aſſumed the military character, and went into Syria with the commiſſion of tribune: but this did not ſuit his taſte any more than it had done Tully's; and therefore we find him returning after a campaign or two. He tells us, that in his paſſage homewards he was detained by contrary winds at the iſland Icaria, and how he employed himſelf in making verſes: he enlarges in the ſame place upon his poetical exercitations; yet poetry was not the ſhining part of his character any more than it had been of Tully's.

Upon his return from Syria, he married a wife, and ſettled at Rome: it was in the reign of Domitian. During this moſt perilous time, he continued to plead in the forum, where he was not more diſtinguiſhed by his uncommon abilities and eloquence, than by his great reſolution and courage, which enabled him to ſpeak boldly, when ſcarcely one elſe durſt ſpeak at all. On theſe accounts he was often ſingled out by the ſenate to defend the plundered provinces againſt their oppreſſive governors, and to manage other cauſes of a like important and dangerous nature. One of theſe was for the province of Bætica, in their proſecution of Bæbius Maſſa; in which he acquired ſo general an applauſe, that the emperor Nerva, then a private man, and in baniſhment at Tarentum, wrote to him a letter, in which he congratulated not only Pliny, but the age which had produced an example ſo much in the ſpirit of the ancients. Pliny relates this affair in a letter to Cornelius Tacitus; and he was ſo pleaſed with it himſelf, that he could not help intreating this friend to record it in his hiſtory. He intreats him, however, with infinitely more modeſty than Tully had intreated Lucceius upon the ſame occaſion: and though he might imitate Cicero in the requeſt, as he profeſſes to have conſtantly ſet that great man before him for a model, yet he took care not to tranſgreſs the bounds of decency in his manner of making it. He obtained the offices of queſtor and tribune, and luckily went unhurt through the reign of Domitian: there is, however, reaſon to ſuppoſe, if that emperor had not died juſt as he did, that Pliny would have ſhared the fate of many other great men; for he tells us himſelf, that his name was afterwards found in Domitian's tables, among the number of thoſe who were deſtined to deſtruction.

He loſt his wife in the beginning of Nerva's reign, and ſoon after married his beloved Calphurnia, of whom we read ſo much in his Epiſtles. He had not, however, any children by any of his wives: and hence we find him thanking Trajan for the *jus trium liberorum*, which he afterwards obtained of that emperor for his friend Suetonius Tranquillus. He hints alſo, in his letter of thanks to Trajan, than he had been twice married in the reign of Domitian. He was promoted to the conſulate by Trajan in the year 100, when he was 38 years of age; and in this office pronounced that famous panegyric, which has ever ſince been admired, as well for the copiouſneſs of the topics as the elegance of addreſs. Then he was elected augur, and afterwards made proconſul of Bithynia; whence he wrote to Trajan that curious letter concerning the primitive Chriſtians; which, with Trajan's reſcript, is happily extant among his Epiſtles. Pliny's letter, as Mr Melmoth obſerves in a note upon the paſſage, is eſteemed as almoſt the only genuine monument of eccleſiaſtical antiquity relating to the times immediately ſucceeding the apoſtles, it being written at moſt not above 40 years after the death of St Paul. It was preſerved by the Chriſtians themſelves, as a clear and unſuſpicious evidence of the purity of their doctrines, and is frequently appealed to by the early writers of the church againſt the calumnies of their adverſaries. It is not known what became of Pliny after his return from Bithynia; whether he lived at Rome, or what time he ſpent at his country houſes. Antiquity is alſo ſilent as to the time of his death: but it is conjectured that he died either a little before or ſoon after that excellent prince, his admired Trajan; that is, about the year of Chriſt 116.

Pliny was one of the greateſt wits, and one of the wealthieſt men among the ancients. He had fine parts, which he cultivated to the utmoſt; and he accompliſhed himſelf with all the various kinds of knowledge which could ſerve to make him either uſeful or agreeable. He wrote and publiſhed a great number of things; but nothing has eſcaped the wreck of time except the books of Letters, and the panegyric upon Trajan. This has ever been conſidered as a maſterpiece: and if he has, as ſome think, almoſt exhauſted all the ideas of perfection in a prince, and gone perhaps a little beyond the truth, yet it is allowed that no panegyriſt was ever poſſeſſed of a finer ſubject, and on which he might better indulge in all the flow of eloquence, without incurring the ſuſpicion of flattery and lies. His letters ſeem to have been intended for the public; and in them he may be conſidered as writing his own memoirs. Every epiſtle is a kind of hiſtorical ſketch, wherein we have a view of him in ſome ſtriking attitude either of active or contemplative life. In them are preſerved anecdotes of many eminent perſons, whoſe works have come down to us, as Suetonius, Silius Italicus, Martial, Tacitus, and Quintilian; and of curious things, which throw great light upon the hiſtory of thoſe times. They are written with great politeneſs and ſpirit; and if they abound too much in turn and metaphor, we muſt impute it to that degeneracy of taſte which was then accompanying the degenerate manners of Rome. Pliny, however, ſeems to have preſerved himſelf in this latter reſpect from the general contagion: whatever the manners of the Romans were, his were pure and incorrupt. His writings breathe a ſpirit of tranſcendent goodneſs and humanity: his only imperfection is, he was too deſirous that the public and poſterity ſhould know how humane and good he was. We have two elegant Engliſh tranſlations of his Epiſtles; the one by Mr Melmoth, and the other by Lord Orrery.

PLOCAMA, a genus of plants belonging to the pentandria claſs. See BOTANY *Index*,

PLOCE. See ORATORY, p. 433.

PLOCKSKO, a town of Poland, and capital of a palatinate of the ſame name, with a caſtle and a biſhop's ſee. The churches are very magnificent; and it is built upon a hill, whence there is a fine proſpect every way, near the river Viſtula. It is 25 miles ſouth-eaſt of Uladiſlaw, and 65 weſt of Warſaw. E. Long. 19. 29. N. Lat. 52. 46.

PLOCKSKO, a palatinate of Poland, bounded on the north by Regal Pruſſia, on the eaſt by the palatinate of Mazovia, on the ſouth by the Viſtula, and on the weſt by the palatinate of Inovladiſlaw. The capital town is of the ſame name.

PLOEN is a town of Germany in the circle of Lower Saxony, and capital of Holſtein. It ſtands on the banks of a lake of the ſame name, and gave title to a duke, till by the death of the laſt duke Charles without male iſſue it eſcheated to the king of Denmark in 1761. The ducal palace, riſing in the midſt of the town, on an elevated ſpot of ground, and overlooking the lake, is a very pictureſque object. The town ſtands 22 miles north-weſt of Lubeck, and 10 ſouth-eaſt of Kiell. E. Long. 10. 30. N. Lat. 54. 11.

PLOMO, in *Metallurgy*, is a name given by the Spaniards, who have the care of the ſilver mines, to the ſilver ore, when found adhering to the ſurface of ſtones, and when it incruſts their cracks and cavities like ſmall and looſe grains of gun-powder. Though theſe grains be few in number, and the reſt of the ſtone have no ſilver in it, yet they are always very happy when they find it, as it is a certain token that there is a rich vein ſomewhere in the neighbourhood. And if in digging forwards they ſtill meet with theſe grains, or the plomo in greater quantity, it is a certain ſign that they are getting nearer and nearer the good vein.

PLOT, DR ROBERT, a learned antiquarian and philoſopher, was born at Sutton-barn, in the pariſh of Borden in Kent, in the year 1641, and ſtudied in Magdalen-hall, and afterwards in Univerſity-college, Oxford. In 1682 he was elected ſecretary of the Royal Society, and publiſhed the Philoſophical Tranſactions from N° 143 to N° 166 incluſive. The next year Elias Aſhmole, Eſq. appointed him firſt keeper of his muſeum, and about the ſame time the vice-chancellor nominated him firſt profeſſor of chemiſtry in the univerſity of Oxford. In 1687 he was made ſecretary to the Earl Marſhal, and the following year received the title of *Hiſtoriographer* to King James II. In 1690 he reſigned his profeſſorſhip of chemiſtry, and likewiſe his place of keeper of the muſeum, to which he preſented a very large collection of natural curioſities; which were thoſe he had deſcribed in his hiſtories of Oxfordſhire and Staffordſhire: the former publiſhed at Oxford in 1677, folio, and reprinted with additions and corrections in 1705; and the latter was printed in the ſame ſize in 1686. In January 1694-5, Henry Howard, Earl Marſhal, nominated him Mobray-herald extraordinary; two days after which he was conſtituted regiſter of the court of honour; and, on the 30th of April 1696, he died of the ſtone at his houſe in Borden.

As Dr Plot delighted in natural hiſtory, the above works were deſigned as eſſays towards a Natural Hiſtory of England; and he had actually formed a deſign of travelling through England and Wales for that purpoſe. He accordingly drew up a plan of his ſcheme in a letter to the learned Biſhop Fell; which is inſerted at the end of the ſecond volume of Leland's Itinerary, of the edition of 1744. Amongſt ſeveral MSS. which he left behind him were large materials for the "Natural Hiſtory of Kent, Middleſex, and the city of London." Beſides the above works, he publiſhed *De origine fontium tentamen philoſophicum*, 8vo, and nine papers in the Philoſophical Tranſactions.

PLOT, in dramatic poetry, is ſometimes uſed for the fable of a tragedy or comedy; but more properly for the knot or intrigue, which makes the *embarras* of any piece. See POETRY.

PLOT, in *Surveying*, the plan or draught of any field, farm, or manor, ſurveyed with an inſtrument, and laid down in the proper figure and dimenſions.

PLOTINUS, a Platonic philoſopher in the third century. He was born at Lycopolis, a city of Egypt, in 204; and began very early to ſhow a great ſingularity both in his taſte and manners: for, at eight years of age, when he went to ſchool, he uſed to run to his nurſe, and uncover her breaſt to ſuck; and would have continued that practice longer, if he had not been diſcouraged by her. At 28 years of age he had a ſtrong deſire to ſtudy philoſophy, on which occaſion he was recommended to the moſt famous profeſſors of Alexandria. He was not ſatisfied with their lectures; but, upon hearing thoſe of Ammonius, he confeſſed that this was the man he wanted. He ſtudied for 11 years under that excellent maſter, and then went to hear the Perſian and Indian philoſophers: for in 243, when the emperor Gordianus intended to wage war againſt the Perſians, he followed the Roman army, but probably repented of it; for it was with difficulty he could ſave his life by flight, after the emperor had been ſlain. He was then 39; and the year following, he went to Rome, and read philoſophical lectures in that city; but avoided following the example of Erennius and Origen, his fellow-pupils, who, having promiſed with him not to reveal ſome hidden and excellent doctrines they had received from Ammonius, had nevertheleſs forfeited their word. Plotinus continued ten years in Rome, without writing any thing; but, in his 50th year, Porphyry became his ſcholar; who, being of an exquiſitely fine genius, was not ſatisfied with ſuperficial anſwers, but required to have all difficulties thoroughly explained; and therefore Plotinus, to treat things with greater accuracy, was obliged to write more books. He had before written 21 books, and during the ſix years of Porphyry's ſtay with him he wrote 24, and 9 after Porphyry's leaving Rome, in all 54. The Romans had a high veneration for him; and he paſſed for a man of ſuch judgement and virtue, that many perſons of both ſexes, when they found themſelves dying, intruſted him, as a kind of guardian angel, with the care of their eſtates and children. He was the arbiter of numberleſs law-ſuits; and conſtantly behaved with ſuch humanity and rectitude of mind, that he did not create himſelf one enemy during the 26 years he reſided in Rome. He, however, did not meet with the ſame juſtice from all of his own profeſſion; for Olympias a philoſopher of Alexandria, being envious of his glory, uſed his utmoſt endeavours, though in vain, to ruin him. The emperor Gallienus, and the empreſs Salonina, had a very high regard for him; and, had it not been for the oppoſition of ſome jealous courtiers, they would have had the city of Campania rebuilt, and given to him with the territory belonging to it, to eſtabliſh a colony of philoſophers, and to have it governed by the ideal laws of Plato's commonwealth. He laboured under various diſorders during the laſt year of his life, which obliged him to leave Rome, when he was carried to Campania to the heirs of one of his friends, who furniſhed him with every thing neceſſary; and he died there in the year 270, at the age of 66, and in the nobleſt manner that an heathen philoſopher could do, theſe being his words as he breathed his laſt: "I am labouring with all my might to return the divine part of me to the Divine Whole which fills the univerſe."

We have already remarked that the ideas of Plotinus were ſingular and extraordinary; and we ſhall now ſhow that they were ſo. He was aſhamed of being lodged in a body, for which reaſon he did not care to tell the place of his birth or family. The contempt he had for all earthly things, was the reaſon why he would not permit his picture to be drawn: and when his diſciple Amelius was urgent with him upon this head, "Is it not enough (ſaid he) to drag after us, whitherſoever we go, that image in which nature has ſhut us up? Do you think that we ſhould likewiſe tranſmit to future ages an image of that image, as a ſight worthy of their attention?" From the ſame principle, he refuſed to attend to his health; for he made no uſe of preſervatives or baths, and did not even eat the fleſh of tame animals. He ate but little, and abſtained very often from bread; which, joined to his intenſe meditation, kept him very much from ſleeping. In ſhort, he thought the body altogether below his notice; and had ſo little reſpect for it, that he conſidered it as a priſon, from whence it would be his ſupreme happineſs to be freed. When Amelius, after his death, inquired about the ſtate of his ſoul of the oracle of Apollo, he was told, "that it was gone to the aſſembly of the bleſſed, where charity, joy, and a love of the union with God prevail:" and the reaſon given for it, as related by Porphyry, is, "that Plotinus had been peaceable, gracious, and vigilant; that he had perpetually elevated his ſpotleſs ſoul to God; that he had loved God with his whole heart; that he had diſengaged himſelf, to the utmoſt of his abilities, from this wretched life; that, elevating himſelf with all the powers of his ſoul, and by the ſeveral gradations taught by Plato, towards that Supreme Being which fills the univerſe, he had been enlightened by him; had enjoyed the viſion of him without the help or interpoſition of ideas; had, in ſhort, been often united to him." This is the account of Porphyry, who tells us alſo, that he himſelf had once been favoured with the viſion. To this account, however, we need ſcarcely add, that little credit is due: it agrees pretty much with modern enthuſiaſm and the reveries of Behmeniſts. Plotinus had alſo his familiar ſpirit, as well as Socrates; but, according to Porphyry, it was not one of thoſe called *demons*, but of the order of thoſe who are called *gods;* ſo that he was under the protection of a genius ſuperior to that of other men. The ſuperiority of his genius puffed him up not a little: for when Amelius deſired him to ſhare in the ſacrifices, which he uſed to offer up on ſolemn feſtivals, "It is their buſineſs (replied Plotinus) to come to me, not mine to go to them:" "which lofty anſwer (ſays Porphyry) no one could gueſs the reaſon of, or dared to aſk."

Porphyry put the 54 books of Plotinus in order, and divided them into ſix enneades. The greater part of them turn on the moſt high-flown ideas in metaphyſics; and this philoſopher ſeems, in certain points, not to differ much from Spinoza. He wrote two books to prove, that "all being is one and the ſame;" which is the very doctrine of Spinoza. He inquires, in another book, "Whether there are many ſouls, or only one?" His manner of compoſing partook of the ſingularity of his nature: he never read over his compoſitions after he had written them; he wrote a bad hand, and was not exact in his orthography: he ſtood in need, therefore, of a faithful friend to reviſe and correct his writings; and he choſe Porphyry for this purpoſe before Amelius, who had, however, been his diſciple 24 years, and was very much eſteemed by him. Some have accuſed Plotinus of plagiariſm, with regard to Numenius; a ſlander which Amelius refuted. Longinus was once much prejudiced againſt our great philoſopher, and wrote againſt his Treatiſe of Ideas, and againſt Porphyry's anſwer in defence of that treatiſe. He afterwards conceived a high eſteem for him; ſought induſtriouſly for all his books; and, in order to have them very correct, deſired Porphyry to lend him his copy; but at the ſame time wrote to him in the following manner: "I always obſerved to you, when we were to-

Plotinus ‖ Pluche.

gether, when we were at a diſtance from one another, as well as when you lived at Tyre, that I did not comprehend many of the ſubjects treated of by Plotinus; but that I was extremely fond of his manner of writing, the variety of his knowledge, and the order and diſpoſition of his queſtions, which are altogether philoſophical." "This ſingle paſſage (ſays Bayle) ſhows the exalted genius, the exquiſite diſcernment, and judicious penetration of Longinus. It cannot be denied, that moſt ſubjects which this philoſopher examines are incomprehenſible; nevertheleſs, we diſcover in his works a very elevated, fruitful, and capacious genius, and a cloſe way of reaſoning. Had Longinus been an injudicious critic, had he not poſſeſſed an exalted and beautiful genius, he would not have been ſo ſenſible of Plotinus's obſcurity: for no perſons complain leſs of the obſcurity of a book, than thoſe whoſe thoughts are confuſed and underſtanding is ſhallow." Marſilius Ficinus, at the requeſt of Coſmo de Medicis, made a Latin verſion of the works of Plotinus, with a ſummary and analyſis of each book; which was printed at Baſil, firſt by itſelf, in 1559, and afterwards with the Greek in 1580, folio. His life was written by Porphyry, the moſt illuſtrious of his diſciples.

PLOTUS, or DARTER, a genus of birds belonging to the order ANSERES. See ORNITHOLOGY *Index*.

PLOUGH, in *Agriculture*, a machine for turning up the ſoil by the action of cattle, contrived to ſave the time, labour, and expence, which, without this inſtrument, muſt have been employed in digging the ground, and fitting it for receiving all ſorts of ſeed. See AGRICULTURE.

PLOUGHMAN, the perſon who guides the plough in the operation of tilling.

PLOUGHING, in *Agriculture*, the turning up the earth with a plough. See AGRICULTURE, *paſſim*.

PLOVER, the Engliſh name of ſeveral ſpecies of CHARADRIUS, ORNITHOLOGY *Index*.

PLOWDEN, EDMUND, ſerjeant at law, deſcended from an ancient family in Shropſhire, was born in 1517, and was firſt a ſtudent of the univerſity of Cambridge, where he ſpent three years in the ſtudy of philoſophy and medicine. He then removed to Oxford, where, having continued his former ſtudies about four years more, in 1552 he was admitted to the practice of phyſic and ſurgery: but probably finding the practice of the art of healing leſs agreeable than the ſtudy, he entered himſelf of the Middle Temple, and began to read law. Wood ſays, that in 1557 he was ſummer reader to that ſociety, and Lent-reader three years after, being then ſergeant and oracle of the law. He died in the year 1584, aged 67; and was buried in the Temple church. He wrote, 1. Commentaries or Reports of divers Caſes, &c. in the reigns of King Edward VI. Queen Mary, and Queen Elizabeth; London, 1571, 78, 99, 1613, &c. Written in the old Norman language. 2. Queries, or a Moot-book of caſes, &c. tranſlated, methodized, and enlarged, by H. B. of Lincoln's-Inn. London, 1662, 8vo.

PLUCHE, ANTONY, a celebrated French writer, was born at Rheims in 1688, and having diſtinguiſhed himſelf by his engaging manners and proficiency in the belles-lettres, was appointed profeſſor of humanity in the univerſity of that city. Two years after he obtained the chair of rhetoric, and was admitted into holy orders.

Pluche.

The biſhop of Laon (Clermont) informed of his talents, conferred upon him the direction of the college of his epiſcopal city. By his induſtry and ſuperior knowledge, a proper order and ſubordination ſoon took place in it; but ſome peculiar opinions reſpecting the affairs of the time diſturbed his tranquillity, and obliged him to quit his office. The intendant of Rouen, at the requeſt of the celebrated Rollin, entruſted him with the education of his ſon. Abbé Pluche having filled that place with ſucceſs and great honour to himſelf, left Rouen and went to Paris, where, by the patronage of ſome literary friends and his own excellent writings, he acquired a very diſtinguiſhed reputation for learning. He publiſhed, 1. *Le Spectacle de la Nature* (Nature Diſplayed), in 9 vols in 12mo. This work, which is equally inſtructive and entertaining, is written with perſpicuity and elegance; but the form of dialogue which is adopted has rendered it rather prolix. The ſpeakers, who are the Prior, the Count, and Counteſs, are not diſtinguiſhed by any ſtriking feature; but they have all the common character, which is tolerably pleaſing, not excepting even that of the little chevalier de Breuil, who is, however, a mere ſcholar. This is the opinion which Abbé Desfontaines has formed of this work. Though the author has given the converſations a pretty ingenious turn, and even ſome vivacity, yet now and then they aſſume the tone of the college. 2. *Hiſtoire du Ciel*, or Hiſtory of the Heavens, in 2 vols in 12mo. In this performance we find two parts almoſt independent of one another. The firſt contains ſome learned inquiries into the origin of the poetic heavens. It is nearly a complete mythology, founded upon ideas which are new and ingenious. The ſecond is the hiſtory of the opinions given by philoſophers reſpecting the formation of the world. The author ſhows the inutility, the inconſtancy, and uncertainty, of the moſt eſteemed ſyſtems; and concludes with pointing out the excellence and ſublime ſimplicity of the Moſaic account. Beſides a noble and well-turned expreſſion, we find in it an erudition which does not fatigue the mind. As to the foundation of the ſyſtem explained in the firſt part, though it appears extremely plauſible, we will not take upon us to ſay how far it is true: Voltaire called it *Fable du Ciel*, or a Fable of the Heavens. 3. *De Linguarum artificio*; a work which he tranſlated with this title, *La Mecanique des Langues*, in 12mo. In this treatiſe he propoſes a ſhort and eaſy method of learning languages, which is by the uſe of tranſlations inſtead of themes or exerciſes; his reflections on that ſubject are judicious and well expreſſed. 4. Harmony of the Pſalms and the Goſpel, or a Tranſlation of the Pſalms and Hymns of the Church, with Notes relative to the Vulgate, the Septuagint, and Hebrew Text, printed at Paris in 1764, in 12mo. In 1749, Abbé Pluche retired to Varenne St Maure, where he gave himſelf up entirely to devotion and ſtudy. Having become ſo deaf that he could not hear without the help of a trumpet, the capital afforded him little entertainment. It was in this retreat that he died of an apoplexy on the 20th of November 1761, at the age of 73 years. He poſſeſſed thoſe qualities which form the ſcholar, the honeſt man, and the Chriſtian: temperate in his meals, true to his word, an affectionate parent, a ſenſible friend, and a humane philoſopher; he gave leſſons of virtue in his life as well as his writings. His ſubmiſſion to all the dogmas of religion was very great.

Some Deiſts having been ſurpriſed that, in matters of faith, he ſhould think and ſpeak like the vulgar, his anſwer was, "I glory in doing ſo: It is infinitely more rational to believe the word of God, than to follow the glimmering lights of a reaſon which is limited and ſubject to error."

PLUG, certain pieces of timber, formed like the fruſtum of a cone, and uſed to ſtop the hauſe holes and the breaches made in the body of a ſhip by cannon-balls; the former of which are called *hauſe-plugs*, and the latter *ſhot plugs*, which are formed of various ſizes in proportion to the holes made by the different ſizes of ſhot, which may penetrate the ſhip's ſides or bottom in battle; accordingly they are always ready for this purpoſe.

PLUKENET, Leonard, a phyſician who flouriſhed in the reign of King Charles II. was one of the moſt excellent and laborious botaniſts of that or any other age. He was author of the *Phytographia Plukenetiana*, the *Almageſticum Britannicum*, and other works of the like kind, on which he ſpent the greateſt part of his life and fortune. His Phytography is mentioned with the higheſt encomiums in the Philoſophical Tranſactions for February 1696-7. His *Opera Botanica*, with cuts, were printed at London in 6 vols folio, in 1720.

PLUM-tree. See Prunus, Botany *Index*.

PLUMAGE, the feathers which ſerve birds for a covering. See Ornithology.

PLUMB-line, among artificers, denotes a perpendicular to the horizon; ſo called, as being commonly erected by means of a plummet.

PLUMBAGO, Lead-wort; a genus of plants belonging to the pentandria claſs. See Botany *Index*.

Plumbago, or *Black-Lead*. See Graphite, Mineralogy *Index*.

PLUMBERY, the art of caſting and working lead, and uſing it in building.

As this metal melts ſoon and with little heat, it is eaſy to caſt it into figures of any kind, by running it into moulds of braſs, clay, plaſter, &c. But the chief article in plumbery is ſheets and pipes of lead; and as theſe make the baſis of the plumber's work, we ſhall here give the proceſs of making them.

In caſting *ſheet-lead*, a table or mould is made uſe of, which conſiſts of large pieces of wood well jointed, and bound with bars of iron at the ends; on the ſides of which runs a frame conſiſting of a ledge or border of wood, three inches thick and four inches high from the mould, called the *ſharps*: The ordinary width of the mould, within theſe ſharps, is from four to five feet; and its length is 16, 17, or 18 feet. This ſhould be ſomething longer than the ſheets are intended to be, in order that the end where the metal runs off from the mould may be cut off, becauſe it is commonly thin or uneven, or ragged at the end. It muſt ſtand very even or level in breadth, and ſomething falling from the end in which the metal is poured in, viz. about an inch or an inch and a half in the length of 16 or 17 feet or more, according to the thickneſs of the ſheets wanted; for the thinner the ſheet, the more declivity the mould ſhould have. At the upper end of the mould ſtands the pan, which is a concave triangular priſm, compoſed of two planks nailed together at right angles, and two triangular pieces fitted in between them at the ends. The length of this pan is the whole breadth of the mould in which the ſheets are caſt; it ſtands with its bottom, which is a ſharp edge, on a form at the end of the mould, leaning with one ſide againſt it; and on the oppoſite ſide is a handle to lift it up by, to pour out the melted lead; and on that ſide of the pan next the mould are two iron hooks to take hold of the mould, and prevent the pan from ſlipping while the melted lead is pouring out of it into the mould. This pan is lined on the inſide with moiſtened ſand, to prevent it from being fired by the hot metal. The mould is alſo ſpread over, about two inches thick, with ſand ſifted and moiſtened, which is rendered perfectly level by moving over it a piece of wood called a *ſtrike*, and ſmoothing it over with a ſmoothing plane, which is a plate of poliſhed braſs, about one-fourth of an inch thick and nine inches ſquare, turned up on all the four edges, and with a handle fitted on to the upper or concave ſide. The ſand being thus ſmoothed, it is fit for caſting ſheets of lead: but if they would caſt a ciſtern, they meaſure out the bigneſs of the four ſides; and having taken the dimenſions of the front or fore-part, make mouldings by preſſing long ſlips of wood, which contain the ſame mouldings, into the level ſand; and form the figures of birds, beaſts, &c. by preſſing in the ſame manner leaden figures upon it, and then taking them off, and at the ſame time ſmoothing the ſurface where any of the ſand is raiſed up by making theſe impreſſions upon it. The reſt of the operation is the ſame in caſting either ciſterns or plain ſheets of lead. But before we proceed to mention the manner in which that is performed, it will be neceſſary to give a more particular deſcription of the *ſtrike*. The ſtrike, then, is a piece of board about five inches broad, and ſomething longer than the breadth of the mould on the inſide; and at each end is cut a notch about two inches deep, ſo that when it is uſed it rides upon the ſharps with thoſe notches. Before they begin to caſt, the ſtrike is made ready by tacking on two pieces of an old hat on the notches, or by ſlipping a caſe of leather over each end, in order to raiſe the under ſide about one-eighth of an inch or ſomething more above the ſand, according as they would have the ſheet to be in thickneſs; then they tallow the under edge of the ſtrike, and lay it acroſs the mould. The lead being melted, it is put into the pan with ladles, in which, when there is a ſufficient quantity for the preſent purpoſe, the ſcum of the metal is ſwept off with a piece of board to the edge of the pan, letting it ſettle on the ſand, which is by this means prevented from falling into the mould at the pouring out of the metal. When the lead is cool enough, which muſt be regulated according to the thickneſs of the ſheets wanted, and is known by its beginning to ſtand with a ſhell or wall on the ſand round the pan, two men take the pan by the handle, or elſe one of them lifts it by the bar and chain fixed to a beam in the ceiling, and pour it into the mould, while another man ſtands ready with the ſtrike, and, as ſoon as they have done pouring in the metal, puts on the mould, ſweeps the lead forward, and draws the overplus into a trough prepared to receive it. The ſheets being thus caſt, nothing remains but to roll them up or cut them into any meaſure wanted: but if it be a ciſtern, it is bent into four ſides, ſo that the two ends may join the back, where they are ſoldered together; after which the bottom is ſoldered up.

The method of caſting pipes without ſoldering.—To make theſe pipes they have a kind of little mill, with arms or levers to turn it withal. The moulds are of braſs, and conſiſt of two pieces, which open and ſhut by means of hooks and hinges, their inward caliber or diameter being according to the ſize of the pipe, uſually two feet and a half. In the middle is placed a core or round piece of braſs or iron, ſomewhat longer than the mould, and of the thickneſs of the inward diameter of the pipe. This core is paſſed through two copper rundles, one at each end of the mould, which they ſerve to cloſe; and to theſe is joined a little copper tube about two inches long, and of the thickneſs the leaden pipe is intended to be of. By means of theſe tubes, the core is retained in the middle of the cavity of the mould. The core being in the mould, with the rundles at its two ends, and the lead melted in the furnace, they take it up in a ladle, and pour it into the mould by a little aperture at one end, made in the form of a funnel. When the mould is full, they paſs a hook into the end of the core, and, turning the mill, draw it out; and then opening the mould, take out the pipe. If they deſire to have the pipe lengthened, they put one end of it in the lower end of the mould, and paſs the end of the core into it; then ſhut the mould again, and apply its rundle and tube as before, the pipe juſt caſt ſerving for a rundle, &c. at the other end, Things being thus replaced, they pour in freſh metal, and repeat the operation till they have got a pipe of the length required.

For making pipes of ſheet-lead, the plumbers have wooden cylinders, of the length and thickneſs required; and on theſe they form their pipes by wrapping the ſheet around them, and ſoldering up the edges all along them.

The lead which lines the Chineſe tea-boxes is reduced to a thinneſs which we are informed European plumbers cannot imitate. The following account of the proceſs by which the plates are formed was communicated to a writer in the Gentleman's Magazine by an intelligent officer of an Eaſt Indiaman. The caſter ſits by a pot containing the melted metal; and has two large ſtones, the under one fixed, the upper moveable, directly before him. He raiſes the upper ſtone by preſſing his foot upon the ſide of it, and with an iron ladle pours in the opening a proper quantity of the fluid metal. He then immediately lets fall the upper ſtone, and by that means forms the lead into a thin irregular plate, which is afterwards cut into a proper ſhape. The ſurfaces of the ſtones, where they touch each other, are exactly ground together.

PLUMBUM, Lead. See Lead, Chemistry *Index*.

Plumbum Corneum, or muriate of lead, a combination of lead with muriatic acid. See Lead, Chemistry *Index*.

PLUME, or Plumula, in *Botany*, the bud or germ. See Gemma.

PLUMIER, Charles, a learned Minim, born at Marſeilles, and one of the moſt able botaniſts of the 17th century. He was inſtructed by the famous Maignan, who taught him mathematics, turnery, the art of making ſpectacles, burning-glaſſes, microſcopes, and other works. He at length went to Rome to perfect himſelf in his ſtudies, and there applied himſelf entirely to botany under a ſkilful Italian. At his return to Provence, he ſettled in the convent at Bormes, a maritime place near Hieres, where he had the conveniency of making diſcoveries in the fields with reſpect to ſimples. He was ſome time after ſent by the French king to America, to bring from thence ſuch plants as might be of ſervice in medicine. He made three different voyages to the Antilles, and viſited the iſland of St Domingo. The king honoured him with a penſion; and he at laſt ſettled at Paris. However, at the deſire of M. Fagon, he prepared to go a fourth time to America, to examine the tree which produces the Jeſuits bark; but died at the port of Santa Maria, near Cadiz, in 1706. He wrote ſeveral excellent works; the principal of which are. 1. A volume of the Plants in the American Iſlands. 2. A Treatiſe on the American Fern. 3. The Art of Turnery; a curious work embelliſhed with plates.

PLUMMET, *Plumb-Rule*, or *Plumb-line*, an inſtrument uſed by carpenters, maſons, &c. in order to judge whether walls, &c. be upright planes, horizontal, or the like. It is thus called from a piece of lead, faſtened to the end of a cord, which uſually conſtitutes this inſtrument. Sometimes the ſtring deſcends along a wooden ruler, &c. raiſed perpendicularly on another; in which caſe it becomes a level.

PLUMMING, among miners, is the method of uſing a mine-dial, in order to know the exact place of the work where to ſink down an air-ſhaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

It is performed in this manner: A ſkilful perſon with an aſſiſtant, and with pen, ink, and paper, and a long line, and a mine-dial, after his gueſs of the place above ground, deſcends into the adit or work, and there faſtens one end of the line to ſome fixed thing in it; then the incited needle is let to reſt, and the exact point where it reſts is marked with a pen: he then goes on farther in, the line ſtill faſtened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwiſe: and then letting down the dial again, he there likewiſe notes down that point at which the needle ſtands in this ſecond poſition. In this manner he proceeds, from turning to turning, marking down the points, and marking the line, till he comes to the intended place: this done, he aſcends and begins to work on the ſurface of the earth what he did in the adit, bringing the firſt knot in the line to ſuch a place where the mark of the place of the needle will again anſwer its pointing, and continues this till he come to the deſired place above ground, which is certain to be perpendicular over the part of the mine into which the air-ſhaft is to be ſunk.

PLUMOSE, ſomething formed in the manner of a feather, with a ſtem and fibres iſſuing from it on each ſide; ſuch are the antennæ of certain moths, butterflies, &c.

PLURAL, in *Grammar*, an epithet applied to that number of nouns and verbs which is uſed when we ſpeak of more than one thing. See Grammar.

PLURALITY, a diſcrete quality, conſiſting of two or a greater number of the ſame kind: thus we ſay, a plurality of gods, &c. See the article Astronomy, N° 157. for the arguments both for and againſt a plurality of worlds.

Plurality

PLURALITY of Benefices, or *Livings*, is where the ſame clerk is poſſeſſed of two or more ſpiritual preferments with care of ſouls. See BENEFICE.

The ſmallneſs of ſome benefices firſt gave riſe to pluralities; for an eccleſiaſtic, unable to ſubſiſt on a ſingle one, was allowed to hold two; and at length the number increaſed without bounds. A remedy was attempted for this abuſe at the council of Lateran under Alexander III. and Innocent III. in the year 1215, when the holding more than one benefice was forbid by a canon under the penalty of deprivation; but the ſame canon granting the pope a power to diſpenſe with it in favour of perſons of diſtinguiſhed merit, the prohibition became almoſt uſeleſs. They were alſo reſtrained by ſtatute 21 Hen. VIII. cap. 13. which enacts, that if any perſon having one benefice with cure of ſouls, of the yearly value of 8l. or above (in the king's books), accept any other with cure of ſouls, the firſt ſhall be adjudged in law to be void, &c. though the ſame ſtatute provides for diſpenſation in certain caſes.

In England, in order to procure a diſpenſation, the preſentee muſt obtain of the biſhop, in whoſe dioceſe the livings are, two certificates of the values in the king's books, and the reputed values and diſtance; one for the archbiſhop, and the other for the lord chancellor. And if the livings lie in two dioceſes, then two certificates of the ſame kind are to be obtained from each biſhop. He muſt alſo ſhow the archbiſhop his preſentation to the ſecond living; and bring with him two teſtimonials from the neighbouring clergy concerning his behaviour and converſation, one for the archbiſhop and the other for the lord-chancellor; and he muſt alſo ſhow the archbiſhop his letters of orders, and a certificate of his having taken the degree of maſter of arts at the leaſt, in one of the univerſities of this realm, under the hand of the regiſter. And if he be not doctor or bachelor of divinity, nor doctor nor bachelor of law, he is to procure a qualification of a chaplain, which is to be duly regiſtered in the faculty office, in order to be tendered to the archbiſhop, according to the ſtatute. And if he hath taken any of the aforeſaid degrees, which the ſtatute allows as qualifications, he is to procure a certificate thereof as already mentioned, and to ſhow the ſame to the archbiſhop; after which his diſpenſation is made out at the faculty office, where he gives ſecurity according to the direction of the canon. He muſt then repair to the lord-chancellor for confirmation under the broad ſeal; and he muſt apply to the biſhop of the dioceſe where the living lies for his admiſſion and inſtitution. By the ſeveral ſtamp acts, for every ſkin, or paper, or parchment, &c. on which any diſpenſation to hold two eccleſiaſtical dignities or benefices, or a dignity and a benefice, ſhall be engroſſed or written, there ſhall be paid a treble 40s. ſtamp duty.

We have alſo a regulation in regard to pluralities; but it is often diſpenſed with: for, by the faculty of diſpenſation, a pluraliſt is required, in that benefice from which he ſhall happen to be moſt abſent, to preach 13 ſermons every year, and to exerciſe hoſpitality for two months yearly.

In Germany the pope grants diſpenſation for poſſeſſing a plurality of benefices, on pretence that the eccleſiaſtical princes there need large revenues to bear up againſt the Proteſtant princes.

Plus
||
Plutarch.

PLUS, in *Algebra*, a character marked thus +, uſed for the ſign of addition. See ALGEBRA.

PLUSH, in commerce, &c. a kind of ſtuff, having a ſort of velvet knap or ſhag on one ſide, compoſed regularly of a woof of a ſingle woollen thread and a double warp; the one wool, of two threads twiſted; the other goats or camels hair; though there are ſome pluſhes entirely of worſted, and others compoſed wholly of hair.

PLUTARCH, a great philoſopher and hiſtorian of antiquity, who lived from the reign of Claudius to that of Hadrian, was born at Chæronea, a ſmall city of Bœotia in Greece. Plutarch's family was ancient in Chæronea: his grandfather Lamprias was eminent for his learning and a philoſopher; and is often mentioned by Plutarch in his writings, as is alſo his father. Plutarch was initiated early in ſtudy, to which he was naturally inclined; and was placed under the care of Ammonius, an Egyptian, who, having taught philoſophy with great reputation at Alexandria, from thence travelled into Greece, and ſettled at Athens. Under this maſter he made great advances in knowledge; and like a thorough philoſopher, more apt to regard things than words, he purſued this knowledge to the neglect of languages. The Roman language at that time was not only the language of Rome, but of Greece alſo: and much more uſed there than the French is now in England. Yet he was ſo far from regarding it then, that, as we learn from himſelf, he became not converſant in it till the declenſion of his life: and, though he is ſuppoſed to have reſided in Rome near 40 years at different times, yet he never ſeems to have acquired a competent ſkill in it. But this was not the worſt: he did not cultivate his mother-tongue with any great exactneſs; and hence that harſhneſs, inequality and obſcurity in his ſtyle, which has ſo frequently and ſo juſtly been complained of.

After he was principled and grounded by Ammonius, having an inſatiable thirſt for knowledge, he reſolved to travel. Egypt was at that time, as formerly it had been, famous for learning; and probably the myſteriouſneſs of their doctrine might tempt him, as it had tempted Pythagoras and others, to go and converſe with the prieſthood of that country. This appears to have been particularly his buſineſs, by his treatiſe *Of Iſis and Oſiris*: in which he ſhows himſelf verſed in the ancient theology and philoſophy of the wiſe men. From Egypt he returned into Greece; and viſiting in his way all the academies and ſchools of the philoſophers, gathered from them many of thoſe obſervations with which he has abundantly enriched poſterity. He does not ſeem to have been attached to any particular ſect, but culled from each of them whatever he thought excellent and worthy to be regarded. He could not bear the paradoxes of the Stoics, but yet was more averſe from the impiety of the Epicureans: in many things he followed Ariſtotle; but his favourites were Socrates and Plato, whoſe memory he revered ſo highly, that he annually celebrated their birth-days with much ſolemnity. Beſides this, he applied himſelf with extreme diligence to collect not only all books that were excellent in their kind, but alſo all the ſayings and obſervations of wiſe men which he had heard in converſation or had received from others by tradition; and likewiſe to comſult the records and public inſtruments preſerved in cities which he had viſited in his travels. He took a particular journey to Sparta, to ſearch the archives of that famous commonwealth, to underſtand thoroughly the model of their ancient government, the hiſtory of their legiſlators, their kings, and their ephori; and digeſted all their memorable deeds and ſayings with much care. He took the ſame methods with regard to many other commonwealths; and thus was enabled to leave us in his works ſuch a rich cabinet of obſervation upon men and manners, as, in the opinion of Montaigne and Bayle, have rendered him the moſt valuable author of antiquity.

The circumſtances of Plutarch's life are not known, and therefore cannot be related, with any exactneſs. According to the learned Fabricius, he was born under Claudius, 50 years after the Chriſtian era. He was married to a moſt amiable woman of his own native town, whoſe name, according to the probable conjecture of Rualdus, was Timoxena, and to whoſe ſenſe and virtue he has borne the moſt affectionate teſtimony in his moral works. He had ſeveral children, and among them two ſons; one called *Plutarch* after himſelf, the other *Lamprias* in memory of his grandfather. Lamprias was he, of all his children, who ſeems to have inherited his father's philoſophy; and to him we owe the table or catalogue of Plutarch's writings, and perhaps alſo his apophthegms. He had a nephew, Sextus Chæroneus, who taught the learned emperor Marcus Aurelius the Greek tongue, and was much honoured by him. Some think, that the critic Longinus was of his family; and Apuleius, in the firſt book of his Metamorphoſes, affirms himſelf to be deſcended from him.

On what occaſion, and at what time of his life, he went to Rome, how long he lived there, and when he finally returned to his own country, are all uncertain. It is probable, that the fame of him went thither before him, not only becauſe he had publiſhed ſeveral of his works, but becauſe immediately upon his arrival, as there is reaſon to believe, he had a great reſort of the Roman nobility to hear him: for he tells us himſelf, that he was ſo taken up in giving lectures of philoſophy to the great men of Rome, that he had not time to make himſelf maſter of the Latin tongue, which is one of the firſt things that would naturally have engaged his attention. It appears that he was ſeveral times at Rome; and perhaps one motive for his living there was the intimacy he had contracted in ſome of theſe journeys with Soſſius Senecio, a great and worthy man, who had been four times conſul, and to whom Plutarch has dedicated many of his lives. But the great inducement which carried him firſt to Rome, was undoubtedly that which had carried him into ſo many other parts of the world; namely, to make obſervations upon men and manners, and to collect materials for writing the lives of the Roman worthies, in the ſame manner as he had already written thoſe of the Grecian: and accordingly he not only converſed with all the living, but ſearched the records of the Capitol, and of all the libraries. Not but, as we learn from Suidas, he was intruſted alſo with the management of public affairs in the empire, during his reſidence in the metropolis. "Plutarch (ſays he) lived in the time of Trajan, who beſtowed on him the conſular ornaments and alſo cauſed an edict to be paſſed, that the magiſtrates or officers of Illyria ſhould do nothing in that province without his knowledge and approbation."

When and how he was made known to Trajan is likewiſe uncertain: but it is generally ſuppoſed that Trajan, a private man when Plutarch firſt came to Rome, was, among other nobility, one of his auditors. It is alſo ſuppoſed, that this wiſe emperor made uſe of him in his councils; at leaſt, much of the happineſs of his reign has been imputed to Plutarch. Fabricius aſſerts that he was Trajan's preceptor, and that he was raiſed to the conſular dignity by him, and made procurator of Greece in his old age by the emperor Adrian. We are equally at a loſs concerning the time of his abode in the imperial city; which, however, at different times, is not imagined to fall much ſhort of 40 years. The deſire of viſiting his native country, ſo natural to all men, and eſpecially when growing old, prevailed with him at length to leave Italy: and at his return he was unanimouſly choſen archon or chief magiſtrate of Chæronea, and not long after admitted into the number of the Delphic Apollo's prieſts. We have no particular account of his death, either as to the manner of it or the year; only it is evident that he lived, and continued his ſtudies, to a good old age. The moſt probable conjecture is that of Fabricius, who ſays he died in the fifth year of Adrian, at the age of 70.

His works have been divided, and they admit of a pretty equal diviſion, into Lives and Morals: the former of which, in his own eſtimation, were to be preferred as more noble than the latter. His ſtyle, as we have already obſerved, has been excepted to with ſome reaſon: he has alſo been criticiſed for ſome miſtakes in Roman antiquities, and for a little partiality to the Greeks. On the other hand, he has been juſtly praiſed for the copiouſneſs of his fine ſenſe and learning, for his integrity, and for a certain air of goodneſs which appears in all he wrote. His buſineſs was not to pleaſe the ear, but to inſtruct and charm the mind; and in this none ever went beyond him. Of his moral writings it is to be regretted that we have no elegant Engliſh tranſlation. Even his Lives were chiefly known to the Engliſh reader by a motley and miſerable verſion, till a new one executed with fidelity and ſpirit was preſented to the public by the Langhornes in 1770. On the whole, it is to be wiſhed that this moſt amiable moraliſt and biographer had added a life of himſelf to thoſe which he has given to the world of others, as the particulars which other writers have preſerved of his perſonal hiſtory are very doubtful and imperfect.

PLUTO, in Pagan worſhip, the king of the infernal regions, was the ſon of Saturn and Ops, and the brother of Jupiter and Neptune. This deity finding himſelf childleſs and unmarried, mounted his chariot to viſit the world; and arriving in Sicily, fell in love with Proſerpine, whom he ſaw gathering flowers with her companions in the valley of Enna, near Mount Ætna: when, forcing her into his chariot, he drove her to the river Chemarus, through which he opened himſelf a paſſage back to the realms of night. See CERES and PROSERPINE.

Pluto is uſually repreſented in an ebony chariot drawn by four black horſes; ſometimes holding a ſceptre, to denote his power; at others, a wand, with which he drives away the ghoſts; and at others, ſome keys, to ſignify that he had the keys of death. Homer obſerves, that his helmet had the quality of rendering the wearer inviſible, and that Minerva borrowed it in order to be concealed from Mars when ſhe fought againſt the Trojans. Pluto was greatly revered both by the Greeks and Romans, who erected temples and altars to him. To this god ſacrifices were offered in the night, and it was not lawful to offer them by day.

PLUTUS, in Pagan worſhip, the god of riches, is frequently confounded with Pluto. He was repreſented as appearing lame when he approached, and with wings at his departure; to ſhow the difficulty of amaſſing wealth, and the uncertainty of its enjoyment. He was alſo frequently repreſented blind, to ſhow that he often beſtowed his favours on the moſt unworthy, and left in neceſſity thoſe who had the greateſt merit.

PLUVIALIS, a ſpecies of plover. See CHARADRIUS, ORNITHOLOGY *Index*.

PLUVIUS, a ſurname of Jupiter. He was invoked by that name among the Romans whenever the earth was parched up by continual heat, and was in want of refreſhing rains. He had an altar in the temple on the capitol.

PLYERS, in fortification, denote a kind of balance uſed in raiſing or letting down a draw-bridge. They conſiſt of two timber levers, twice as long as the bridge they lift, joined together by other timbers framed in the form of a St Andrew's croſs to counterpoiſe them. They are ſupported by two upright jambs, on which they ſwing; and the bridge is raiſed or let down by means of chains joining the ends of the plyers and bridge.

PLYING, in the ſea language, the act of making, or endeavouring to make, a progreſs againſt the direction of the wind. Hence a ſhip that advances well in her courſe in this manner of ſailing, is ſaid to be a good plyer. See the articles BEATING, PITCHING, and TACKING.

PLYMOUTH, a town of Devonſhire, in England, about 215 miles from London, ſtands between the rivers Plym and Tamar, juſt before they fall into the Britiſh channel. From a mere fiſhing village it has become one of the largeſt towns in the county; and is one of the chief magazines in the kingdom, on account of its port, which is one of the ſafeſt in England, and which is ſo large as to be able to contain 1000 ſail. It is defended by ſeveral different forts, mounting altogether nearly 300 guns; of which the chief is the Royal Citadel, erected in the reign of Charles II. oppoſite to St Nicholas iſland, which is within the circuit of its walls, and contains a large ſtore-houſe and five regular baſtions. In time of war the outward-bound convoys generally rendezvous at Plymouth, and homeward-bound ſhips generally put in to provide pilots up the Channel. It is alſo a great place of reſort for men of war that are wind-bound.

The mouth of the Tamar is called Ham-Ooze, and that of Plym Catwater, which are both commanded by the caſtle on St Nicholas iſland. About two miles up the mouth of the Tamar there are four docks, two of which were built in the reign of William III. one wet and the other dry, and two which have been built ſince. They have every conveniency for building or repairing ſhips. One of the docks is hewn out of a mine of ſlate, and lined with Portland ſtone. This town enjoys a pilchard fiſhery of conſiderable importance, and carries on an extenſive trade with Newfoundland and the Straits. There is a cuſtomhouſe in it; and though there are two churches (and beſides ſeveral meeting-houſes), yet each church has ſo large a cure of ſouls, that the pariſh clerks were till very lately in deacons orders, to enable them to perform all the occaſional and other offices. The ſeat-rents are given to the poor. The lecturers are choſen every three years by the corporation, which was conſtituted by Henry VI. and conſiſts of a mayor, 12 aldermen, and 24 common-council men. The mayor is elected by a jury of 36 perſons, choſen by four others, two of whom are appointed by the mayor and aldermen, and the other two by the common-council. There is alſo a recorder, and a town-clerk, whoſe place is very profitable. The town conſiſts of four diviſions, which were anciently governed by four captains, each of whom had three conſtables under him. It is well ſupplied with freſh water, which was brought from the diſtance of ſeven miles, by Sir Francis Drake a native of the town. The toll of the markets, and of the cotton, yarn, &c. with the profit of the mill, which is very conſiderable, belongs to the corporation, as do the revenues of the ſhambles, which are farmed out for the mayor's kitchen. There is a charity-ſchool in Plymouth, four hoſpitals, and a workhouſe, in all which 100 poor children are clothed, fed, and taught; and there are two printing-houſes. To one of the hoſpitals Colonel Jory gave a charity for 12 poor widows, as he did a mace worth 120l. to be carried before the mayor, and ſix good bells, valued at 500l. to Charles-Church, ſo called from our kings in whoſe reigns it was begun and finiſhed. In the entrance of the bay lies the famous Eddyſtone rock, which is covered at high water, and on which the ingenious Mr Winſtanley built a light-houſe, that was blown down in the terrible hurricane of Nov. 27th 1703, and himſelf, with others that were with him in it, never more heard of. However, another was erected in the room of it, by the corporation of the Trinity-houſe, in the time of Queen Anne, which was deſtroyed by an accidental fire Dec. 4th 1755, but rebuilt in 1759: which alſo was burnt down, and rebuilt by the celebrated Smeaton in the year 1770. In the reign of Edward III. the French landed, and burnt part of the town, but were ſoon repulſed by Hugh Courtenay earl of Devon. In the reign of Henry IV. the French landed here again, and burnt 600 houſes. Between this town and the ſea is a hill called the Haw, which has a delightful plain on the top, having a pleaſant proſpect all round it, and a good landmark for the uſe of mariners. The liſt of parliament-men for this borough, formerly divided into two parts, by the names of Sutton-Valtort and Sutton-Prior, commences the 26th of Edward I. and continues to the 14th of Edward III. after which we find no return made for it till the 20th of Henry VI. when the privilege was renewed. On the Haw is a fort, which at once commands the town and defends the harbour. Here is a ferry over the Tamar, called Crumwell or Crimble Paſſage, the weſt ſide of which is called Weſtone-Houſe, and is in Devonſhire, though moſt of the pariſh wherein it ſtands is in Cornwall. In April 1759 parliament granted 25,159l. for the better fortifying the town and dock of Plymouth. N. Lat. 50. 26. W. Long. 4. 15.

PLYMOUTH, in New England, a ſea-port town, and capital of the county of the ſame name, in the province

Plymouth, Plynteria.

of Maſſachuſets Bay, in North America. It is remarkable for having been the firſt ſettlement in New England, and for having had the firſt place of worſhip. It is ſeated at the ſouth end of Plymouth bay. W. Long. 70. 10. N. Lat. 41. 58.

PLYNTERIA, a Grecian feſtival in honour of Aglauros, or rather of Minerva, who received from the daughter of Cecrops the name of Aglauros. The word is derived from πλυνειν, *lavare*, becauſe during the ſolemnity they undreſſed the ſtatue of the goddeſs and waſhed it. The day on which it was obſerved was looked upon as unfortunate and inauſpicious; and therefore no perſon was permitted to appear in the temples, as they were purpoſely ſurrounded with ropes. The arrival of Alcibiades in Athens that day was thought very unfortunate, but the ſucceſs that ever after attended him proved it to be otherwiſe. It was cuſtomary at this feſtival to bear in proceſſion a cluſter of figs; which intimated the progreſs of civilization among the firſt inhabitants of the earth, as figs ſerved them for food after they had found a diſlike for acorns.

Plynteri

PNEUMATICS.

1 Definition of the term.

THIS term is reſtricted, in the preſent habits of our language, to that part of natural philoſophy which treats of the mechanical properties of elaſtic fluids. The word, in its original meaning, expreſſes a quality of air, or more properly of breath. Under the article PHYSICS we obſerved, that in a great number of languages the term uſed to expreſs breath was alſo one of the terms uſed to expreſs the animating principle, nay, the intellectual ſubſtance, the ſoul. It has been perhaps owing to ſome attention to this chance of confuſion that our philoſophers have appropriated the term PNEUMATICS to the ſcience of the mechanical properties of air, and PNEUMATOLOGY to the ſcience of the intellectual phenomena conſequent on the operations or affections of our thinking principle.

2 Extent of the ſcience.

We have extended (on the authority of preſent cuſtom) the term PNEUMATICS to the ſtudy of the mechanical properties of all elaſtic or ſenſibly compreſſible fluids, that is, of fluids whoſe elaſticity and compreſſibility become an intereſting object of our attention; as the term HYDROSTATICS is applied to the ſtudy of the mechanical properties of ſuch bodies as intereſt us by their fluidity or liquidity only, or whoſe elaſticity and compreſſibility are not familiar or intereſting, though not leſs real or general than in the caſe of air and all vapours.

3 No preciſe limit to the different claſſes of bodies.

We may be indulged in the obſervation by the bye, that there is no preciſe limit to the different claſſes of natural bodies with reſpect to their mechanical properties. There is no ſuch thing as a body perfectly hard, perfectly ſoft, perfectly elaſtic, or perfectly incompreſſible. All bodies have ſome degree of elaſticity intermixed with ſome degree of ductility. Water, mercury, oil, are compreſſible; but their compreſſibility need not be attended to in order perfectly to underſtand the phenomena conſequent on their materiality, fluidity, and gravity. But if we neglect the compreſſibility of air, we remain ignorant of the cauſe and nature of its moſt intereſting phenomena, and are but imperfectly informed with reſpect to thoſe in which its elaſticity has no ſhare; and it is convenient to attend to this diſtinction in our reſearches, in order to underſtand thoſe phenomena which depend ſolely or chiefly on compreſſibility and elaſticity. This obſervation is important; for here elaſticity appears in its moſt ſimple form, unaccompanied with any other mechanical affection of matter (if we except gravity), and lies moſt open to our obſervation, whether employed for inveſtigating the nature of this very property of bodies, or for explaining its mode of action. We ſhall even find that the conſtitution of an avowedly elaſtic fluid, whoſe compreſſibility is ſo very ſenſible, will give us the diſtincteſt notions of fluidity in general, and enable us to underſtand its *characteriſtic appearances*, by which it is diſtinguiſhed from ſolidity, namely, the *equable* diſtribution of preſſure through all its parts in every direction, and the horizontality which its ſurface aſſumes by the action of gravity: phenomena which have been aſſumed as equivalent to the definition of a perfect fluid, and from which all the laws of hydroſtatics and hydraulics have been derived. And theſe laws have been applied to the explanation of the phenomena around us; and water, mercury, oil, &c. have been denominated fluid only becauſe their appearances have been found to tally exactly with theſe conſequences of this definition, while the definition itſelf remains in the form of an aſſumption, unſupported by any other proof of its obtaining in nature. A real mechanical philoſopher will therefore attach himſelf with great eagerneſs to this property, and conſider it as an introduction to much natural ſcience.

4 Air the moſt familiar compreſſible fluid.

Of all the ſenſible compreſſible fluids air is the moſt familiar, was the firſt ſtudied, and the moſt minutely examined. It has therefore been generally taken as the example of their mechanical properties, while thoſe mechanical properties which are peculiar to any of them, and therefore characteriſtic, have uſually been treated as an appendix to the general ſcience of pneumatics. No objection occurs to us againſt this method, which will therefore be adopted in treating this article.

5 Different properties of it.

But although the mechanical properties are the proper ſubjects of our conſideration, it will be impoſſible to avoid conſidering occaſionally properties which are more of a chemical nature; becauſe they occaſion ſuch modifications of the mechanical properties as would frequently be unintelligible without conſidering them in conjunction with the other; and, on the other hand, the mechanical properties produce ſuch modifications of the properties merely chemical, and of very intereſting phenomena conſequent on them, that theſe would often paſs unexplained unleſs we give an account of them in this place.

6 Mechanic properties.

By *mechanical properties* we would be underſtood to mean ſuch as produce, or are connected with, ſenſible changes of motion, and which indicate the preſence and agency of moving or mechanical powers. They are therefore the ſubject of mathematical diſcuſſion; admitting of meaſure, number, and direction, notions purely mathematical.

We ſhall therefore begin with the conſideration of air.

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It is by no means an idle queſtion, "*What is this* air of which ſo much is ſaid and written?" We ſee nothing, we feel nothing. We find ourſelves at liberty to move about in any direction without any let or hinderance. Whence, then, the aſſertion, that we are ſurrounded with a *matter* called air? A few very ſimple obſervations and experiments will ſhow us that this aſſertion is well founded.

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Plate
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We are accuſtomed to ſay, that a veſſel is empty when we have poured out of it the water which it contained. Take a cylindrical glaſs jar (fig. 1.), having a ſmall hole in its bottom; and having ſtopped this hole, fill the jar with water, and then pour out the water, leaving the glaſs empty, in the common acceptation of the word. Now, throw a bit of cork, or any light body, on the ſurface of water in a ciſtern: cover this with the glaſs jar A held in the hand with its bottom upwards, and move it downwards, as at B, keeping it all the while in an upright poſition. The cork will continue to float on the ſurface of the water in the inſide of the glaſs, and will moſt diſtinctly ſhow whereabouts that ſurface is. It will thus be ſeen, that the water within the glaſs has its ſurface conſiderably lower at C than that of the ſurrounding water; and however deep we immerge the glaſs, we ſhall find that the water will never riſe in the inſide of it ſo as to fill it. If plunged to the depth of 32 feet, the water will only half fill it; and yet the acknowledged laws of hydroſtatics tell us, that the water would fill the glaſs if there were nothing to hinder it. There is therefore ſomething already within the glaſs which prevents the water from getting into it; manifeſting in this manner the moſt diſtinctive property of matter, viz. the hindering other matter from occupying the ſame place at the ſame time.

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While things are in this condition, pull the ſtopper D out of the hole in the bottom of the jar, and the water will inſtantly riſe in the inſide of the jar, and ſtand at an equal height within and without. This is juſtly aſcribed to the eſcape through the hole of the *matter* which formerly obſtructed the entry of the water; for if the hand be held before the hole, a puff will be diſtinctly felt, or a feather held there will be blown aſide; indicating in this manner that what prevented the entry of the water, and now eſcapes, poſſeſſes another characteriſtic property of matter, *impulſive force*. The materiality is concluded from this appearance, in the ſame manner that the materiality of water is concluded from the impulſe of a jet from a pipe. We alſo ſee the mobility of the formerly pent up, and now liberated, ſubſtance, in conſequence of external preſſure, viz. the preſſure of the ſurrounding water.

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ity,

Alſo, if we take a ſmooth cylindrical tube, ſhut at one end, and fit a plug or cork to its open end, ſo as to ſlide along it, but ſo tightly as to prevent all paſſage by its ſides; and if the plug be well ſoaked in greaſe, we ſhall find that no force whatever can puſh it to the bottom of the tube. There is therefore *ſomething* within the tube preventing by its impenetrability the entry of the plug, and therefore poſſeſſing this characteriſtic of matter.

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ſticity,

In like manner, if, after having opened a pair of common bellows, we ſhut up the nozzle and valve hole, and try to bring the boards together, we find it impoſſible. There is ſomething included which prevents this, in the ſame manner as if the bellows were filled with wool; but on opening the nozzle we can eaſily ſhut them, viz. by expelling this ſomething; and if the compreſſion be forcible, the ſomething will iſſue with conſiderable force, and very ſenſibly impel any thing in its way.

12
Inertia, and
mobility.

It is not accurate to ſay, that we move about without *any* obſtruction: for we find, that if we endeavour to move a large fan with rapidity, a very ſenſible hinderance is perceived, and that a very ſenſible force muſt be exerted; and a ſenſible wind is produced, which will agitate the neighbouring bodies. It is therefore juſtly concluded that the motion is poſſible only in conſequence of having driven this obſtructing ſubſtance out of the way; and that this impenetrable, reſiſting, moveable, impelling ſubſtance, is *matter*. We perceive the perſeverance of this matter in its ſtate of reſt when we wave a fan, in the ſame manner that we perceive the *inertia* of water when we move a paddle through it. The effects of wind in impelling our ſhips and mills, in tearing up trees, and overturning buildings, are equal indications of its perſeverance in a ſtate of motion.

To this matter, when at reſt, we give the name Air; and when it is in motion we call it Wind.

13
It is there-
fore a ma-
terial fluid.

Air, therefore, is a material fluid: a fluid, becauſe its parts are eaſily moved, and yield to the ſmalleſt inequality of preſſure.

14
Heavy, and

Air poſſeſſes ſome others of the very general, though not eſſential, properties of matter. It is heavy. This appears from the following facts.

1. It always accompanies this globe in its orbit round the ſun, ſurrounding it to a certain diſtance, under the name of the Atmosphere, which indicates the being connected with the earth by its general force of gravity. It is chiefly in conſequence of this that it is continually moving round the earth from eaſt to weſt; forming what is called the trade-wind, to be more particularly conſidered afterwards. All that is to be obſerved on this ſubject at preſent is, that, in conſequence of the diſturbing force of the ſun and moon, there is an accumulation of the air of the atmoſphere, in the ſame manner as of the waters of the ocean, in thoſe parts of the globe which have the moon near their zenith or nadir: and as this happens ſucceſſively, going from the eaſt to the weſt (by the rotation of the earth round its axis in the oppoſite direction), the accumulated air muſt gradually flow along to form the elevation. This is chiefly to be obſerved in the torrid zone; and the generality and regularity of this motion are greatly diſturbed by the changes which are continually taking place in different parts of the atmoſphere from cauſes which are not mechanical.

15
ſupports
the clouds.

2. It is in like manner owing to the gravity of the air that it ſupports the clouds and vapours which we ſee conſtantly floating in it. We have even ſeen bodies of no inconſiderable weight float, and even riſe, in the air. Soap bubbles, and balloons filled with inflammable gas, riſe and float in the ſame manner as a cork riſes in water. This phenomenon proves the weight of the air, in the ſame manner that the ſwimming of a piece of wood indicates the weight of the water which ſupports it.

16
Familiar
proofs of its
weight.

3. But we are not left to theſe refined obſervations

for the proof of the air's gravity. We may obſerve familiar phenomena, which would be immediate conſequences of the ſuppoſition that air is a heavy fluid, and, like other heavy fluids, preſſes on the outſides of all bodies immerſed in or ſurrounded by it. Thus, for inſtance, if we ſhut the nozzle and valve hole of a pair of bellows after having ſqueezed the air out of them, we ſhall find that a very great force, even ſome hundred pounds, is neceſſary for ſeparating the boards. They are kept together by the preſſure of the heavy air which ſurrounds them in the ſame manner as if they were immerſed in water. In like manner, if we ſtop the end of a ſyringe after its piſton has been preſſed down to the bottom, and then attempt to draw up the piſton, we ſhall find a conſiderable force neceſſary, viz. about 15 or 16 pounds for every ſquare inch of the ſection of the ſyringe. Exerting this force, we can draw up the piſton to the top, and we can hold it there; but the moment we ceaſe acting, the piſton ruſhes down and ſtrikes the bottom. It is called a ſuction, as we feel ſomething as it were drawing in the piſton; but it is really the weight of the incumbent air preſſing it in. And this obtains in every poſition of the ſyringe; becauſe the air is a fluid, and preſſes in every direction. Nay, it preſſes on the ſyringe as well as on the piſton; and if the piſton be hung by its ring on a nail, the ſyringe requires force to draw it down (juſt as much as to draw the piſton up); and if it be let go, it will ſpring up, unleſs loaded with at leaſt 15 pounds for every ſquare inch of its tranſverſe ſection (ſee fig. 2.).

Plate CCCCXXIII. Fig. 2.

17 It may even be weighed.

4. But the moſt direct proof of the weight of the air is had by weighing a veſſel empty of air, and then weighing it again when the air has been admitted; and this, as it is the moſt obvious conſequence of its weight, has been aſſerted as long ago as the days of Ariſtotle. He ſays (**Περί Ουρανου**, iv. 4.), That all bodies are heavy in their place except fire; even air is heavy; for a blown bladder is heavier than when it is empty. It is ſomewhat ſurpriſing that his followers ſhould have gone into the oppoſite opinion, while profeſſing to maintain the doctrine of their leader. If we take a very large and limber bladder, and ſqueeze out the air very carefully, and weigh it, and then fill it till the wrinkles juſt begin to diſappear, and weigh it again, we ſhall find no difference in the weight. But this is not Ariſtotle's meaning; becauſe the bladder, conſidered as a veſſel, is equally full in both caſes, its dimenſions being changed. We cannot take the air out of a bladder without its immediately collapſing. But what would be true of a bladder would be equally true of any veſſel. Fig. 3. Therefore, take a round veſſel A (fig. 3.), fitted with a ſtopcock B, and ſyringe C. Fill the whole with water, and preſs the piſton to the bottom of the ſyringe. Then keeping the cock open, and holding the veſſel upright, with the ſyringe undermoſt, draw down the piſton. The water will follow it by its weight, and leave part of the veſſel empty. Now ſhut the cock, and again puſh up the piſton to the bottom of the ſyringe; the water eſcapes through the piſton valve, as will be explained afterward: then opening the cock, and again drawing down the piſton, more water will come out of the veſſel. Repeat this operation till all the water have come out. Shut the cock, unſcrew the ſyringe, and weigh the veſſel very accurately. Now open the cock, and admit the air, and weigh the veſſel again, it will be found heavier than before, and this additional weight is the weight of the air which fills it; and it will be found to be 523 grains, about an ounce and a fifth avoirdupois, for every cubic foot that the veſſel contains. Now ſince a cubic foot of water would weigh 1000 ounces, this experiment would ſhow that water is about 840 times heavier than air. The moſt accurate judgement of this kind of which we have met with an account is that recorded by Sir George Shuckburgh, which is in the 67th vol. of the Philoſophical Tranſactions, p. 560. From this it follows, that when the air is of the temperature 53, and the barometer ſtands at 29¼ inches, the air is 836 times lighter than water. But the experiment is not ſuſceptible of ſufficient accuracy for determining the exact weight of a cubic foot of air. Its weight is very ſmall; and the veſſel muſt be ſtrong and heavy, ſo as to overload any balance that is ſufficiently nice for the experiment.

18 The moſt onvenient method doing th

To avoid this inconvenience, the whole may be weighed in water, firſt loading the veſſel ſo as to make it preponderate an ounce or two in the water. By this means the balance will be loaded only with this ſmall preponderancy. But even in this caſe there are conſiderable ſources of error, ariſing from changes in the ſpecific gravity of the water and other cauſes. The experiment has often been repeated with this view, and the air has been found at a medium to be about 840 times as light as water, but with great variations, as may be expected from its very heterogeneous nature, in conſequence of its being the menſtruum of almoſt every fluid, of all vapours, and even of moſt ſolid bodies; all which it holds in ſolution, forming a fluid perfectly tranſparent, and of very different denſity according to its compoſition. It is found, for inſtance, that perfectly pure air of the temperature of our ordinary ſummer is conſiderably denſer than when it has diſſolved about half as much water as it can hold in that temperature; and that with this quantity of water the difference of denſity increaſes in proportion as the maſs grows warmer, for damp air is more expanſible by heat than dry air. We have had occaſion to conſider this ſubject when treating of the connection of the mechanical properties of air with the ſtate of the weather. See METEOROLOGY.

19 This property of air denied by the Peripatetics, though acknowledged by their maſter.

Such is the reſult of the experiment ſuggeſted by Ariſtotle, evidently proving the weight of the air; and yet, as has been obſerved, the Peripatetics, who profeſs to follow the *dictates* of Ariſtotle, uniformly refuſed it this property. It was a matter long debated among the philoſophers of the laſt century. The reaſon was, that Ariſtotle, with that indiſtinctneſs and inconſiſtency, which is obſerved in all his writings which relate to matters of fact and experience, aſſigns a different cauſe to many phenomena which any man led by common obſervation would aſcribe to the weight of the air. Of this kind is the riſe of water in pumps and ſyphons, which all the Peripatetics had for ages aſcribed to ſomething which they called *nature's abhorrence of a void.* Ariſtotle had aſſerted (for reaſons not our buſineſs to adduce at preſent), that all nature was full of being, and that nature abhorred a void. He adduces many facts, in which it appears, that if not abſolutely impoſſible, it is very difficult, and requires great force, to produce a ſpace void of matter. When the operation of pumps and ſyphons came to be known, the philoſophers of Europe: (who had all embraced the Peripatetic doctrines)

doctrines) found in this fancied horror of a fancied mind (what else is this that nature abhors?) a ready solution of the phenomenon. We shall state the facts, that every reader may see what kinds of reasoning were received among the learned not two centuries ago.

20 Pumps were then constructed in the following manner: A long pipe AB (fig. 4.) was set in the water of the well A. This was fitted with a sucker or piston C, having a long rod CF, and was furnished with a valve B at the bottom, and a lateral pipe DE at the place of delivery, also furnished with a valve. The fact is, that if the piston be thrust down to the bottom, and then drawn up, the water will follow it; and upon the piston being again pushed down, the water shuts the valve B by its weight, and escapes or is expelled at the valve E; and on drawing up the piston again the valve E is shut, the water again rises after the piston, and is again expelled at its next descent.

Fig. 4.

21 The Peripatetics explain all this by saying, that if the water did *not follow the piston* there would be a void between them. But nature abhors a void; or a void is impossible: therefore the water follows the piston.—It is not worth while to criticise the wretched reasoning in this pretence to explanation. It is all overturned by one observation. Suppose the pipe shut at the bottom, the piston *can* be drawn up, and thus a void produced. No, say the Peripatetics; and they speak of certain spirits, effluvia, &c. which occupy the place. But if so, why needs the water rise? This therefore is not the cause of its ascent. It is a curious and important phenomenon.

22 The sagacious Galileo seems to have been the first who seriously ascribed this to the weight of the air. Many before him had supposed air heavy; and thus explained the difficulty of raising the board of bellows, or the piston of a syringe, &c. But he distinctly applies to this allowed weight of the air all the consequences of hydrostatical laws; and he reasons as follows.

23 The heavy air rests on the water in the cistern, and presses it with its weight. It does the same with the water in the pipe, and therefore both are on a level: but if the piston, after being in contact with the surface of the water, be drawn up, there is no longer any pressure on the surface of the water within the pipe; for the air now rests on the piston only, and thus occasions a difficulty in drawing it up. The water in the pipe, therefore, is in the same situation as if more water were poured into the cistern, that is, as much as would exert the same pressure on its surface as the air does. In this case we are certain that the water will be pressed into the pipe, and will raise up the water already in it, and follow it till it is equally high within and without. The same pressure of the air shuts the valve E during the descent of the piston. (See *Gal. Discorsi*).

24 and predicted the height to which water would rise in them.

He did not wait for the very obvious objection, that if the rise of the water was the effect of the air's pressure, it would also be its measure, and would be raised and supported only to a certain height. He directly said so, and adduced this as a decisive experiment. If the horror of a void be the cause, says he, the water must rise to any height however great; but if it be owing to the pressure of the air, it will only rise till the weight of the water in the pipe is in equilibrio with the pressure of the air, according to the common laws of hydrostatics. And he adds, that this is well known; for it is a fact, that pumps will not *draw* water much above forty palms, although they may be made to *propel* it, or *force* it to any height. He then makes an assertion, which, if true, will be decisive. Let a very long pipe, shut at one end, be filled with water, and let it be erected perpendicularly with the close end uppermost, and a stopper in the other end, and then its lower orifice immersed in to a vessel of water; the water will subside in the pipe upon removing the stopper, till the remaining column is in equilibrio with the pressure of the external air. This experiment he proposes to the curious; saying, however, that he thought it unnecessary, their being already such abundant proofs of the air's pressure.

25 It is probable that the cumbersomeness of the necessary apparatus prevented the making of this experiment. Another equally conclusive, and much easier, was made in 1642 after Galileo's death, by his zealous and learned disciple Toricelli. He filled a glass tube, close at one end, with mercury; judging, that if the support of the water was owing to the pressure of the air, and was the measure of this pressure, mercury would in like manner be supported by it, and this at a height which was also the measure of the air's pressure, and therefore 13 times less than water. He had the pleasure of seeing his expectation verified in the completest manner; the mercury descending in the tube AB (fig. 5.), and finally settling at the height *f*B of 29¾ Roman inches: and he found, that when the tube was inclined, the point *f* was in the same horizontal plane with *f* in the upright tube, according to the received laws of hydrostatical pressure. The experiment was often repeated, and soon became famous, exciting great controversies among the philosophers about the possibility of a vacuum. About three years afterwards the same experiment was published, at Warsaw in Poland, by Valerianus Magnus, as his own suggestion and discovery: but it appears plain from the letters of Roberval, not only that Toricelli was prior, and that his experiment was the general topic of discussion among the curious; but also highly probable that Valerianus Magnus was informed of it when at Rome, and daily conversant with those who had seen it. He denies, however, even having heard of the name of Toricelli.

Fig. 5.

This was the era of philosophical ardour; and we think that it was Galileo's invention and immediate application of the telescope which gave it vigour. Discoveries of the most wonderful kind in the heavens, and which required no extent of previous knowledge to understand them, were thus put into the hands of every person who could purchase a spy-glass; while the high degree of credibility which some of the discoveries, such as the phases of Venus and the rotation and satellites of Jupiter, gave to the Copernican system, immediately set the whole body of the learned in motion. Galileo joined to his ardour a great extent of learning, particularly of mathematical knowledge and sound logic, and was even the first who formally united mathematics with physics; and his treatise on accelerated motion was the first, and a precious fruit of this union. About the years 1642 and 1643, we find clubs of gentlemen associated in Oxford and London for the cultivation of knowledge by experiment; and before 1655 all the doctrines of hydrostatics and pneumatics were familiar there, established upon experiment. Mr Boyle procured a coalition and correspondence of these clubs under the name of the Invisible and Philosophical Society. In May 1658 Mr Hooke finished for Mr

26 Origin of the Royal Society, &c.

Boyle.

27
Invention of the air-pump.

Boyle an air pump, which had employed him a long time, and occaſioned him ſeveral journeys to London for things which the workmen of Oxford could not execute. He ſpeaks of this as a great improvement on Mr Boyle's own pump, which he had been uſing ſome time before. Boyle therefore muſt have invented his air-pump, and was not indebted for it to Schottus's account of Otto Guerick's, publiſhed in his (Schottus) *Mechanica Hydraulo-pneumatica* in 1657, as he aſſerts (*Techna Curioſa*). The Royal Society of London aroſe in 1656 from the coalition of theſe clubs, after 15 years co-operation and correſpondence. The Montmorine Society at Paris had ſubſiſted nearly about the ſame time; for we find Paſchal in 1648 ſpeaking of the meetings in the Sorbonne College, from which we know that ſociety originated.—Nuremberg, in Germany, was alſo a diſtinguiſhed ſeminary of experimental philoſophy. The magiſtrates, ſenſible of its valuable influence in many manufactures, the ſource of the opulence and proſperity of their city, and many of them philoſophers, gave philoſophy a profeſſed and munificent patronage, furniſhing the philoſophers with a copious apparatus, a place of aſſembly, and a fund for the expence of their experiments; ſo that this was the firſt academy of ſciences out of Italy under the patronage of government. In Italy, indeed, there had long exiſted inſtitutions of this kind. Rome was the centre of church-government, and the reſort of all expectants for preferment. The clergy was the majority of the learned in all Chriſtian nations, and particularly of the ſyſtematic philoſophers. Each, eager to recommend himſelf to notice, brought forward every thing that was curious; and they were the willing vehicles of philoſophical communication. Thus the experiments of Galileo and Toricelli were rapidly diffuſed by perſons of rank, the dignitaries of the church, or by the monks their obſequious ſervants. Perhaps the recent defection of England, and the want of a reſiding embaſſy at Rome, made her ſometimes late in receiving or ſpreading philoſophical reſearches, and was the cauſe that more was done there *proprio Marte*.

28
The experiments of Galileo and Toricelli rapidly diffuſed.

29
The merit of Toricelli's claimed by others

We hope to be excuſed for this digreſſion, We were naturally led into it by the pretenſions of Valerianus Magnus to originality in the experiment of the mercury ſupported by the preſſure of the air. Such is the ſtrength of national attachment, that there were not wanting ſome who found that Toricelli had borrowed his experiment from Honoratus Fabri, who had propoſed and explained it in 1641; but whoever knows the writings of Toricelli, and Galileo's high opinion of him, will never think that he could need ſuch helps. (See this ſurmiſe of Mounier in *Schott. Tech. Cur.* III. at the end).

Galileo muſt be conſidered as the author of the experiment when he propoſes it to be made. Valerianus Magnus owns himſelf indebted to him for the principle and the contrivance of the experiment. It is neither wonderful that many ingenious men, of one opinion, and inſtructed by Galileo, ſhould ſeparately hit on ſo obvious a thing; nor that Toricelli, his immediate diſciple, his enthuſiaſtic admirer, and who was in the habits of correſponding with him till his death in 1642, ſhould be the firſt to put it in practice. It became the ſubject of diſpute from the national arrogance and ſelf-conceit of ſome Frenchmen, who have always ſhown themſelves diſpoſed to conſider their nation as at the head of the republic of letters, and cannot brook the concurrence of any foreigners. Roberval was in this inſtance, however, the champion of Toricelli; but thoſe who know his controverſies with the mathematicians of France at this time will eaſily account for this exception.

30
unjuſtly.

All now agree in giving Toricelli the honour of the *firſt* invention; and it univerſally paſſes by the name of the TORICELLIAN EXPERIMENT. The tube is called the TORICELLIAN TUBE; and the ſpace left by the mercury is called the TORICELLIAN VACUUM, to diſtinguiſh it from the BOYLEAN VACUUM, which is only an extreme rarefaction.

31
It was repeated in various forms.

The experiment was repeated in various forms, and with apparatus which enabled philoſophers to examine ſeveral effects which the vacuum produced on bodies expoſed in it. This was done by making the upper part of the tube terminate in a veſſel of ſome capacity, or communicate with ſuch a veſſel, in which were included along with the mercury bodies on which the experiments were to be made. When the mercury had run out, the phenomena of theſe bodies were carefully obſerved.

32
An objection to the concluſion drawn from it obviated.

An objection was made to the concluſion drawn from Toricelli's experiment, which appears formidable. If the Toricellian tube be ſuſpended on the arm of a balance, it is found that the counterpoiſe muſt be equal to the weight both of the tube and of the mercury it contains. This could not be, ſay the objectors, if the mercury were ſupported by the air. It is evidently ſupported by the balance; and this gave riſe to another notion of the cauſe different from the peripatetic *fuga vacui*: a ſuſpenſive force, or rather attraction, was aſſigned to the upper part of the tube.

But the true explanation of the phenomenon is moſt eaſy and ſatisfactory. Suppoſe the mercury in the ciſtern and tube to freeze, but without adhering to the tube, ſo that the tube could be freely drawn up and down. In this caſe the mercury is ſupported by the baſe, without any dependence on the preſſure of the air; and the tube is in the ſame condition as before, and the ſolid mercury performs the office of a piſton to this kind of ſyringe. Suppoſe the tube thruſt down till the top of it touches the top of the mercury. It is evident that it muſt be drawn up in oppoſition to the preſſure of the external air, and it is preciſely ſimilar to the ſyringe mentioned in N° 16. The weight ſuſtained therefore by this arm of the balance is the weight of the tube and the downward preſſure of the atmoſphere on its top.

33
Galileo's original experiment performed.

The curioſity of philoſophers being thus excited by this very manageable experiment, it was natural now to try the original experiment propoſed by Galileo. Accordingly Berti in Italy, Paſchal in France, and many others in different places, made the experiment with a tube filled with water, wine, oil, &c. and all with the ſucceſs which might be expected in ſo ſimple a matter: and hence the doctrine of the weight and preſſure of the air was eſtabliſhed beyond contradiction or doubt. All this was done before the year 1648.—A very beautiful experiment was exhibited by Auzout, which completely ſatisfied all who had any remaining doubts.

34
An experiment by Auzout

Fig. 6.

A ſmall box or phial EFGH (fig. 6.) had two glaſs tubes, AB, CD, three feet long, inſerted into it in ſuch a manner as to be firmly fixed in one end, and to reach nearly to the other end. AB was open at both ends, and CD was cloſe at D. This apparatus was completely filled with mercury, by unſcrewing the tube AB, filling

ling the box, and the tube CD; then ſcrewing in the tube AB, and filling it: then holding a finger on the orifice A, the whole was inverted and ſet upright in the poſition repreſented in figure 6, immerſing the orifice A (now *a* of fig. 6) in a ſmall veſſel of quickſilver. The reſult was, that the mercury ran out at the orifice *a*, till its ſurface *m n* within the phial deſcended to the top of the tube *b a*. The mercury alſo began to deſcend in the tube *d c* formerly DC) and run over into the tube *b a*, and run out at *a*, till the mercury in *d c* was very near equal in a level with *m n*. The mercury deſcending in *b a* till it ſtood at *h*, $29\frac{1}{2}$ inches above the ſurface *o p* of the mercury in the ciſtern, juſt as in the Toricellian tube.

The rationale of this experiment is very eaſy. The whole apparatus may firſt be conſidered as a Toricellian tube of an uncommon ſhape, and the mercury would flow out at *a*. But as ſoon as a drop of mercury comes out, leaving a ſpace above *m n*, there is nothing to keep up the mercury in the tube *d c*. Its mercury therefore deſcends alſo; and running over into *b a*, continues to ſupply its expence till the tube *d c* is almoſt empty, or can no longer ſupply the waſte of *b a*. The inner ſurface therefore falls as low as it can, till it is level with *b*. No more mercury can enter *b a*, yet its column is too heavy to be ſupported by the preſſure of the air on the mercury in the ciſtern below; it therefore deſcends in *b a*, and finally ſettles at the height *h o*, equal to that of the mercury in the Toricellian tube.

35
decitive of the queſtion.

The prettieſt circumſtance of the experiment remains. Make a ſmall hole *g* in the upper cap of the box. The external air immediately ruſhes in by its weight, and now preſſes on the mercury in the box. This immediately raiſes the mercury in the tube *d c* to *l*, $29\frac{1}{2}$ inches above *m n*. It preſſes on the mercury at *k* in the tube *b a*, balancing the preſſure of the air in the ciſtern. The mercury in the tube therefore is left to the influence of its own weight, and it deſcends to the bottom. Nothing can be more appoſite or deciſive.

36
The gravity of the air therefore a ſtatical principle from which we obtain

And thus the doctrine of the gravity and preſſure of the air is eſtabliſhed by the moſt unexceptionable evidence: and we are intitled to aſſume it as a ſtatical principle, and to affirm *à priori* all its legitimate conſequences.

And in the firſt place, we obtain an exact meaſure of the preſſure of the atmoſphere. It is preciſely equal to the weight of the column of mercury, of water, of oil, &c. which it can ſupport; and the Toricellian tube, or others fitted up upon the ſame principle, are juſtly termed *baroſcopes* and *barometers* with reſpect to the air. Now it is obſerved that water is ſupported at the height

37
an exact meaſure of the preſſure of the atmoſphere.

of 32 feet nearly: The weight of the column is exactly 2000 avoirdupois pounds on every ſquare foot of baſe, or $13\frac{9}{10}$ on every ſquare inch. The ſame concluſion very nearly may be drawn from the column of mercury, which is nearly $29\frac{1}{2}$ inches high when in equilibrium with the preſſure of the air. We may here obſerve, that the meaſure taken from the height of a column of water, wine, ſpirits, and the other fluids of conſiderable volatility, as chemiſts term it, is not ſo exact as that taken from mercury, oil, and the like. For it is obſerved, that the volatile fluids are converted by the ordinary heat of our climates into vapour when the confining preſſure of the air is removed; and this vapour, by its elaſticity, exerts a ſmall preſſure on the ſurface of the water, &c. in the pipe, and thus counteracts a ſmall part of the external preſſure; and therefore the column ſupported by the remaining preſſure muſt be lighter, that is, ſhorter. Thus it is found, that rectified ſpirits will not ſtand much higher than is competent to a weight of 13 pounds on an inch, the elaſticity of its vapour balancing about $\frac{1}{13}$ of the preſſure of the air. We ſhall afterwards have occaſion to conſider this matter more particularly.

As the medium height of the mercury in the barometer is $29\frac{1}{2}$ inches, we ſee that the whole globe ſuſtains a preſſure equal to the whole weight of a body of mercury of this height; and that all bodies on its ſurface ſuſtain a part of this in proportion to their ſurfaces. An ordinary ſized man ſuſtains a preſſure of ſeveral thouſand

38
A difficulty ſolved.

pounds. How comes it then that we are not ſenſible of a preſſure which one ſhould think enough to cruſh us together? This has been conſidered as a ſtrong objection to the preſſure of the air; for when a man is plunged a few feet under water, he is very ſenſible of the preſſure. The anſwer is by no means ſo eaſy as is commonly imagined. We feel very diſtinctly the effects of removing this preſſure from any part of the body. If any one will apply the open end of a ſyringe to his hand, and then draw up the piſton, he will find his hand ſucked into the ſyringe with great force, and it will give pain; and the ſoft part of the hand will ſwell into it, being preſſed in by the neighbouring parts, which are ſubject to the action of the external air. If one lays his hand on the top of a long perpendicular pipe, ſuch as a pump filled to the brim with water, which is at firſt prevented from running out by the valve below; and if the valve be then opened, ſo that the water deſcends, he will then find his hand ſo hard preſſed to the top of the pipe that he cannot draw it away. But why do we only feel the *inequality* of preſſure? There is a ſimilar inſtance wherein we do not feel it, although we cannot doubt of its exiſtence. When a man goes ſlowly to a great depth under water in a diving-bell, we know unqueſtionably that he is expoſed to a new and very great preſſure, yet he does not feel it. But thoſe facts are not ſufficiently familiar for general argument. The human body is a bundle of ſolids, hard or ſoft, filled or mixed with fluids, and there are few or no parts of it which are empty. All communicate either by veſſels or pores; and the whole ſurface is a ſieve through which the inſenſible perſpiration is performed. The whole extended ſurface of the lungs is open to the preſſure of the atmoſphere; every thing is therefore in equilibrio: and if free or ſpeedy acceſs be given to every part, the body will not be damaged by the preſſure, however great, any more than a wet ſponge would be deranged by plunging it any depth in water. The preſſure is inſtantaneouſly diffuſed by means of the incompreſſible fluids with which the parts are filled; and if any parts are filled with air or other compreſſible fluids, theſe are compreſſed till their elaſticity again balances the preſſure. Beſides, all our fluids are acquired ſlowly, and gradually mixed with that proportion of air which they can diſſolve or contain. The whole animal has grown up in this manner from the firſt vital atom of the embryo. For ſuch reaſons the preſſure can occaſion no change of ſhape by ſqueezing together the flexible parts; nor any obſtruction by compreſſing the veſſels or pores. We cannot ſay what would be felt by a man, were it poſſible that he could have been produced and grown up *in vacuo*, and then ſubjected to the compreſſion. We even know that any ſudden and conſiderable change of general preſſure is very ſeverely felt. Perſons in a diving-bell have been almoſt killed by letting them down or drawing them up too ſuddenly. In drawing up, the elaſtic matters within have ſuddenly ſwelled, and not finding an immediate eſcape have burſt the veſſels. Dr Halley experienced this, the blood guſhing out from his ears by the expanſion of air contained in the internal cavities of this organ, from which there are but very ſlender paſſages.

39 The weather-glaſs.

A very important obſervation recurs here: the preſſure of the atmoſphere is variable. This was obſerved almoſt as ſoon as philoſophers began to attend to the barometer. Paſchal obſerved it in France, and Deſcartes obſerved it in Sweden in 1650. Mr Boyle and others obſerved it in England in 1656. And before this, obſervers, who took notice of the concomitancy of theſe changes of aerial preſſure with the ſtate of the atmoſphere, remarked, that it was generally greateſt in winter and in the night; and certainly moſt variable during winter and in the northern regions. Familiar now with the weight of the air, and conſidering it as the vehicle of the clouds and vapours, they noted with care the connection between the weather and the preſſure of the air, and found that a great preſſure of the air was generally accompanied with fair weather, and a diminution of it with rain and miſts. Hence the barometer came to be conſidered as an index not only of the preſent ſtate of the air's weight, but alſo as indicating by its variations changes of weather. It became a WEATHER-GLASS, and continued to be anxiouſly obſerved with this view. This is an important ſubject, and in another place is treated in ſome detail.

40 The preſſure of the air in proportion to the elevation

In the next place, we may conclude that the preſſure of the air will be different in different places, according to their elevation above the ſurface of the ocean: for if air be an heavy fluid, it muſt preſs in ſome proportion according to its perpendicular height. If it be a homogeneous fluid of equal denſity and weight in all its parts, the mercury in the ciſtern of a barometer muſt be preſſed preciſely in proportion to the depth to which that ciſtern is immerſed in it; and as this preſſure is exactly meaſured by the height of the mercury in the tube, the height of the mercury in the Toricellian tube muſt be exactly proportional to the depth of the place of obſervation under the ſurface of the atmoſphere.

41 firſt ſuppoſed by Deſcartes and Paſchal, and proved by experiments,

The celebrated Deſcartes firſt entertained this thought (Epiſt. 67. of Pr. III.), and ſoon after him Paſchal. His occupation in Paris not permitting him to try the juſtneſs of his conjecture, he requeſted Mr Perrier a gentleman of Clermont in Auvergne, to make the experiment, by obſerving the height of the mercury at one and the ſame time at Clermont and on the top of a very high mountain in the neighbourhood. His letters to Mr Perrier in 1647 are ſtill extant. Accordingly Mr Perrier, in September 1648, filled two equal tubes with mercury, and obſerved the heights of both to be the ſame, viz. $26\frac{7}{24}$ inches, in the garden of the convent of the Friars Minims, ſituated in the loweſt part of Clermont. Leaving one of them there, and one of the fathers to obſerve it, he took the other to the top of Puy de Domme, which was elevated nearly 500 French fathoms above the garden. He found its height to be $23\frac{2}{24}$ inches. On his return to the town, in a place called *Font de l'Arbre*, 150 fathoms above the garden, he found it 25 inches; when he returned to the garden it was again $26\frac{7}{24}$, and the perſon ſet to watch the tube which had been left ſaid that it had not varied the whole day. Thus a difference of elevation of 3000 French feet had occaſioned a depreſſion of $3\frac{1}{8}$ inches; from which it may be concluded, that $3\frac{1}{8}$ inches of mercury weighs as much as 3000 feet of air, and one-tenth of an inch of mercury as much as 96 feet of air. The next day he found, that taking the tube to the top of a ſteeple 120 feet high made a fall of one-ſixth of an inch. This gives 72 feet of air for one-tenth of an inch of mercury; but ill agreeing with the former experiment. But it is to be obſerved, that a very ſmall error of obſervation of the barometer would correſpond to a great difference of elevation, and alſo that the height of the mountain had not been meaſured with any preciſion. This has been ſince done (Mem. Acad. par. 1703), and found to be 529 French toiſes.

42 which were repeated by others.

Paſchal publiſhed an account of this great experiment (*Grande Exp. ſur la Peſanteur de l'Air*), and it was quickly repeated in many places of the world. In 1653 it was repeated in England by Dr Power (Power's Exper. Phil.); and in Scotland, in 1661, by Mr Sinclair profeſſor of philoſophy in the univerſity of Glaſgow, who obſerved the barometer at Lanark, on the top of Mount Tinto in Clydſdale, and on the top of Arthur's Seat at Edinburgh. He found a depreſſion of two inches between Glaſgow and the top of Tinto, three quarters of an inch between the bottom and top of Arthur's Seat, and $\frac{5}{32}$ of an inch at the cathedral of Glaſgow on a height of 126 feet. See Sinclair's *Ars Nova et Magna Gravitatis et Levitatis*; *Sturmii Collegium Experimentale*, and *Schotti Technica Curioſa*.

43 Hence a method of meaſuring heights.

Hence we may derive a method of meaſuring the heights of mountains. Having aſcertained with great preciſion the elevation correſponding to a fall of one-tenth of an inch of mercury, which is nearly 90 feet, we have only to obſerve the length of the mercurial column at the top and bottom of the mountain, and to allow 90 feet for every tenth of an inch. Accordingly this method has been practiſed with great ſucceſs: but it requires an attention to many things not yet conſidered; ſuch as the change of denſity of the mercury by heat and cold; the changes of denſity of air, which are much more remarkable from the ſame cauſes; and above all, the changes of the denſity of air from its compreſſibility; a change immediately connected with or dependent on the very elevation we wiſh to meaſure. Of all theſe afterwards.

44 Alſo a meaſure of the denſity of the air.

Theſe obſervations give us the moſt accurate meaſure of the denſity of air and its ſpecific gravity. This is but vaguely though directly meaſured by weighing air in a bladder or veſſel. The weight of a manageable quantity is ſo ſmall, that a balance ſufficiently tickliſh to indicate even very ſenſible fractions of it is overloaded by the weight of the veſſel which contains it, and ceaſes to be exact: and when we take Bernouilli's ingenious method of ſuſpending it in water, we expoſe ourſelves to great riſk of error by the variation of the water's denſity. Alſo it muſt neceſſarily be humid air which we can examine in this way: but the proportion of an elevation in the atmoſphere to the depreſſion of the column of mercury or other fluid, by which we meaſure its preſſure, gives us at once the proportion of this weight or their ſpecific gravity. Thus ſince it is found that in ſuch a ſtate of preſſure the barometer ſtands at 30 inches, and the thermometer at 32°, 87 feet of riſe produces one-tenth of an inch of fall in the barometer, the air and the mercury being both of the freezing temperature, we muſt conclude that mercury is 10,440 times heavier or denſer than air. Then, by comparing mercury and water, we get $\frac{1}{801}$ nearly for the denſity of air relative to water: but this varies ſo much by heat and moiſture, that it is uſeleſs to retain any thing more than a general notion of it; nor is it eaſy to determine whether this method or that by actual weighing be preferable. It is extremely difficult to obſerve the height of the mercury in the barometer nearer than $\frac{1}{100}$ of an inch; and this will produce a difference of even five feet, or $\frac{1}{18}$ of the whole. Perhaps this is a greater proportion than the error in weighing.

45 and ſome knowledge of the height of the atmoſphere.

From the ſame experiments we alſo derive ſome knowledge of the height of the aerial covering which ſurrounds our globe. When we raiſe our barometer 87 feet above the ſurface of the ſea, the mercury falls about one-tenth of an inch in the barometer: therefore if the barometer ſhows 30 inches at the ſea-ſhore, we may expect that, by raiſing it 300 times 87 feet or 5 miles, the mercury in the tube will deſcend to the level of the ciſtern, and that this is the height of our atmoſphere. But other appearances lead us to ſuppoſe a much greater height. Meteors are ſeen with us much higher than this, and which yet give undoubted indication of being ſupported by our air. There can be little doubt, too, that the viſibility of the expanſe above us is owing to the reflection of the ſun's light by our air. Were the heavenly ſpaces perfectly tranſparent, we ſhould no more ſee them than the pureſt water through which we ſee other objects; and we ſee *them* as we ſee water tinged with milk or other fæculæ. Now it is eaſy to ſhow, that the light which gives us what is called twilight muſt be reflected from the height of at leaſt 50 miles; for we have it when the ſun is depreſſed 18 degrees below our horizon.

46 Why this knowledge is not accurate.

A little attention to the conſtitution of our air will convince us, that the atmoſphere muſt extend to a much greater height than 300 times 87 feet. We ſee from the moſt familiar facts that it is compreſſible; we can ſqueeze it in an ox-bladder. It is alſo heavy; preſſing on the air in this bladder with a very great force, not leſs than 1500 pounds. We muſt therefore conſider it as in a ſtate of compreſſion, exiſting in ſmaller room than it would aſſume if it were not compreſſed by the incumbent air. It muſt therefore be in a condition ſomething reſembling that of a quantity of fine carded wool thrown looſely into a deep pit; the lower ſtrata carrying the weight of the upper ſtrata, and being compreſſed by them; and ſo much the more compreſſed as they are further down, and only the upper ſtratum in its unconſtrained and moſt expanded ſtate. If we ſhall ſuppoſe this wool thrown in by a hundred weight at a time, it will be divided into ſtrata of equal weights, but of unequal thickneſs; the loweſt being the thinneſt, and the ſuperior ſtrata gradually increaſing in thickneſs. Now, ſuppoſe the pit filled with air, and reaching to the top of the atmoſphere, the *weights* of all the ſtrata above any horizontal plane in it is meaſured by the height of the mercury in the Toricellian tube placed in that plane; and one tenth of an inch of mercury is juſt equal to the weight of the loweſt ſtratum 87 feet thick: for on raiſing the tube 87 feet from the ſea, the ſurface of the mercury will deſcend one-tenth of an inch. Raiſe the tube till the mercury fall another tenth: This ſtratum muſt be more than 87 feet thick; how much more we cannot tell, being ignorant of the law of the air's expanſion. In order to make it fall a third tenth, we muſt raiſe it through a ſtratum ſtill thicker; and ſo on continually.

All this is abundantly confirmed by the very firſt experiment made by the order and directions of Paſchal: For by carrying the tube from the garden of the convent to a place 150 fathoms higher, the mercury fell $1\frac{7}{24}$ inches, or 1.2916; which gives about 69 feet 8 inches of aerial ſtratum for $\frac{1}{10}$ of an inch of mercury; and by carrying it from thence to a place 350 fathoms higher, the mercury fell $1\frac{22}{24}$, or 1.9167 inches, which gives 109 feet 7 inches for $\frac{1}{10}$ of an inch of mercury. Theſe experiments were not accurately made; for at that time the philoſophers, though zealous, were but *ſcholars* in the *ſcience* of experimenting, and novices in the art. But the reſults abundantly ſhow this general truth, and they are completely confirmed by thouſands of ſubſequent obſervations. It is evident from the whole tenor of them, that the ſtrata of air decreaſe in denſity as we aſcend through the atmoſphere; but it remained to be diſcovered what is the force of this decreaſe, that is, the law of the air's expanſion. Till this be done we can ſay nothing about the conſtitution of our atmoſphere: we cannot tell in what manner it is fitteſt for raiſing and ſupporting the exhalations and vapours which are continually ariſing from the inhabited regions; not as an excrementitious waſte, but to be ſupported, perhaps manufactured, in that vaſt laboratory of nature, and to be returned to us in beneficent ſhowers. We cannot uſe our knowledge for the curious, and frequently uſeful, purpoſe of meaſuring the heights of mountains and taking the levels of extenſive regions; in ſhort, without an accurate knowledge of this, we can hardly acquire any acquaintance with thoſe mechanical properties which diſtinguiſh air from thoſe liquids which circulate here below.

47 Compreſſibility of the air.

Having therefore conſidered at ſome length the leading conſequences of the air's fluidity and gravity, let us conſider its compreſſibility with the ſame care; and then, combining the agency of both, we ſhall anſwer all the purpoſes of philoſophy, diſcover the laws, explain the phenomena of nature, and improve art. We proceed therefore to conſider a little the phenomena which indicate and characteriſe this other property of the air. All fluids are elaſtic and compreſſible as well as air; but in them the compreſſibility makes no figure, or does not intereſt us while we are conſidering their preſſures, motions, and impulſions. But in air the compreſſibility and expanſion draw our chief attention, and make it a proper repreſentative of this claſs of fluids.

48 A familiar phenomenon, which

Nothing is more familiar than the compreſſibility of air. It is ſeen in a bladder filled with it, which we can forcibly ſqueeze into leſs room; it is ſeen in a ſyringe, of which we can puſh the plug farther and farther as we increaſe the preſſure.

49 ſhows its elaſticity.

But theſe appearances bring into view another, and perhaps the moſt intereſting, property of air, viz. its *elaſticity*. When we have ſqueezed the air in the bladder or ſyringe into leſs room, we find that the force with which we *compreſſed* it is neceſſary to *keep it in this bulk*; and that if we ceaſe to preſs it together, it will ſwell out and regain its natural dimenſions. This diſtinguiſhes it eſſentially from ſuch a body as a maſs of flour, ſalt, or ſuch like, which remain in the compreſſed ſtate to which we reduce them.

50 reſiſting force, and producing motion. There is ſomething therefore which oppoſes the compreſſion different from the ſimple impenetrability of the air: there is ſomething that oppoſes mechanical force: there is ſomething too which produces motion, not only reſiſting compreſſion, but puſhing back the compreſſing body, and communicating motion to it. As an arrow is gradually accelerated by the bow ſtring preſſing it forward, and at the moment of its diſcharge is brought to a ſtate of rapid motion; ſo the ball from a pop-gun or wind gun is gradually accelerated along the barrel by the preſſure of the air during its expanſion from its compreſſed ſtate, and finally quits it with an accumulated velocity. Theſe two motions are indications perfectly ſimilar of the elaſticity of the bow and of the air.

51 Fluidity of the air. Thus it appears that air is heavy and elaſtic. It needs little conſideration to convince us in a vague manner that it is fluid. The eaſe with which it is penetrated, and driven about in every direction, and the motion of it in pipes and channels, however crooked and intricate, entitle it to this character. But before we can proceed to deduce conſequences from its fluidity, and to offer them as a true account of what will happen in theſe circumſtances, it is neceſſary to exhibit ſome diſtinct and ſimple caſe, in which the characteriſtic mechanical property of a fluid is clearly and unequivocally obſerved in it. That property of fluids from which all the laws of hydroſtatics and hydraulics are derived with ſtricteſt evidence is, that any preſſure applied to any part of them is propagated through the whole maſs in every direction; and that in conſequence of this diffuſion of preſſure, any two external forces can be put in equilibrio by the interpoſition of a fluid, in the ſame way as they can be put in equilibrio by the intervention of any mechanical engine.

52 experimentally Fig. 7. Let a cloſe veſſel ABC (fig. 7.), of any form, have two upright pipes EDC, GFB, inſerted into any parts of its top, ſides, or bottom, and let water be poured into them, ſo as to ſtand in equilibrio with the horizontal ſurfaces at E, D, G, F, and let D *d*, F*f*, be horizontal lines, *it will be found* that the height of the column E *d* is ſenſibly equal to that of the column G*f*. This is a fact univerſally obſerved in whatever way the pipes are inſerted.

53 proved. Now the ſurface of the water at D is undoubtedly preſſed upwards with a force equal to a column of water, having its ſurface for its baſe, and E *d* for its height; it is therefore prevented from riſing by ſome oppoſite force. This can be nothing but the elaſticity of the confined air preſſing it down. The very ſame thing muſt be ſaid of the ſurface at F; and thus there are two external preſſures at D and F ſet in equilibrio by the interpoſition of air. The force exerted on the ſurface D, by the preſſure of the column E *d*, is therefore propagated to the ſurface at F; and thus air has this characteriſtic mark of fluidity.

In this experiment the *weight* of the air is inſenſible when the veſſel is of ſmall ſize, and has no ſenſible ſhare in the preſſure reaching at D and F. But if the elevation of the point F above D is very great, the column E *d will be obſerved* ſenſibly to exceed the column G*f*. Thus if F be 70 feet higher than D, E *d* will be an inch longer than the column G*f*: for in this caſe there is reacting at D, not only the preſſure propagated from F, but alſo the weight of a column of air, having the ſurface at D for its baſe and 70 feet high. This is equal to the weight of a column of water one inch high.

It is by this propagation of preſſure, this *fluidity*, that the pellet is diſcharged from a child's pop gun. It ſticks faſt in the muzzle; and he forces in another pellet at the other end, which he preſſes forward with the rammer, condenſing the air between them, and thus propagating to the other pellet the preſſure which he exerts, till the friction is overcome, and the pellet is diſcharged by the air expanding and following it.

54 Hero's fountain. Fig. 8. There is a pretty philoſophical plaything which illuſtrates this property of air in a very perſpicuous manner, and which we ſhall afterwards have occaſion to conſider as converted into a moſt uſeful hydraulic machine. This is what is uſually called *Hero's fountain*, having been invented by a Syracuſan of that name. It conſiſts of two veſſels KLMN (fig. 8.), OPQR, which are cloſe on all ſides. The tube AB, having a funnel a-top, paſſes through the uppermoſt veſſel without communicating with it, being ſoldered into its top and bottom. It alſo paſſes through the top of the under-veſſel, where it is alſo ſoldered, and reaches almoſt to its bottom. This tube is open at both ends. There is another open tube ST, which is ſoldered into the top of the under veſſel and the bottom of the upper veſſel, and reaches almoſt to its top. Theſe two tubes ſerve alſo to ſupport the upper veſſel. A third tube GF is ſoldered into the top of the upper veſſel, and reaches almoſt to its bottom. This tube is open at both ends, but the orifice G is very ſmall. Now ſuppoſe the uppermoſt veſſel filled with water to the height EN, E *e* being its ſurface a little below T. Stop the orifice G with the finger, and pour in water at A. This will deſcend through AB, and compreſs the air in OPQR into leſs room. Suppoſe the water in the under veſſel to have acquired the ſurface C*c*, the air which formerly occupied the whole of the ſpaces OPQR, and KL*e*E will now be contained in the ſpaces *o* P *c* C and KL *e* E; and its elaſticity will be in equilibrio with the weight of the column of water, whoſe baſe is the ſurface E *e*, and whoſe height is A *c*. As this preſſure is exerted in every part of the air, it will be exerted on the ſurface E *e* of the water of the upper veſſel; and if the pipe FG were continued upwards, the water would be ſupported in it to an height *e* H above E *e*, equal to A *c*. Therefore if the finger be now taken from off the orifice G, the water will ſpout up to the ſame height as if it had been immediately forced out by a column of water A *c* without the intervention of the air, that is, nearly to H. If inſtead of the funnel at A, the veſſel have a brim VW which will cauſe the water diſcharged at G to run down the pipe AB, this fountain will play till all the water in the upper veſſel is expended. The operation of this ſecond fountain will be better underſtood from fig. 9. which an intelligent reader will ſee is perfectly equivalent to fig. 8. Fig. 9. A very powerful engine for raiſing water upon this principle has long been employed in the Hungarian mines; where the pipe AB is about 200 feet high, and the pipe FG about 120; and the condenſation is made in the upper veſſel, and communi-

cated to the lower, at the bottom of the mine, by a long pipe. See *Water-Works*.

55
Laws of hydroſtatics applicable to air.

We may now apply to air all the laws of hydroſtatics and hydraulics, in perfect confidence that their legitimate conſequences will be obſerved in all its ſituations. We ſhall in future ſubſtitute, in place of any force acting on a ſurface of air, a column of water, mercury, or any other fluid whoſe weight is equal to this force: and as we know diſtinctly from theory what will be the conſequences of this hydroſtatic preſſure, we ſhall determine *à priori* the phenomena in air; and in caſes where theory does not enable us to ſay with preciſion what is the effect of this preſſure, experience informs us in the caſe of water, and analogy enables us to tranſfer this to air. We ſhall find this of great ſervice in ſome caſes, which otherwiſe are almoſt deſperate in the preſent ſtate of our knowledge.

56
More refined experiments, ſuch as

From ſuch familiar and ſimple obſervations and experiments, the fluidity, the heavineſs, and elaſticity, are diſcovered of the ſubſtance with which we are ſurrounded, and which we call ***air***. But to underſtand theſe properties, and completely to explain their numerous and important conſequences, we muſt call in the aid of more refined obſervations and experiments, which even this ſcanty knowledge of them enables us to make; we muſt contrive ſome methods of producing with preciſion any degree of condenſation or rarefaction, of employing or excluding the gravitating preſſure of air, and of modifying at pleaſure the action of all its mechanical properties.

57
a method of compreſſing the air by
Plate cccxxiv.
Fig. 10.

Nothing can be more obvious than a method of compreſſing a quantity of air to any degree. Take a cylinder or priſmatic tube AB (fig. 10.) ſhut at one end, and fit it with a piſton or plug C, ſo nicely that no air can paſs by its ſides. This will be beſt done in a cylindric tube by a turned ſtopper, covered with oiled leather, and fitted with a long handle CD. When this is thruſt down, the air which formerly occupied the whole capacity of the tube is *condenſed* into leſs room. The force neceſſary to produce any degree of compreſſion may be concluded from the weight neceſſary for puſhing down the plug to any depth. But this inſtrument leaves us little opportunity of making intereſting experiments on or in this condenſed air; and the force required to make any degree of compreſſion cannot be meaſured with much accuracy; becauſe the piſton muſt be very cloſe, and have great friction, in order to be ſufficiently tight: And as the compreſſion is increaſed, the leather is more ſqueezed to the ſide of the tube; and the proportion of the external force, which is employed merely to overcome this variable and uncertain friction, cannot be aſcertained with any tolerable preciſion. To get rid of theſe imperfections, the following addition may be made to the inſtrument, which then becomes what is called the *condenſing ſyringe*.

58
The condenſing ſyringe with

The end of the ſyringe is perforated with a very ſmall hole *ef*; and being externally turned to a ſmall cylinder, a narrow ſlip of bladder, or of thin leather, ſoaked in a mixture of oil and tallow, muſt be tied over the hole. Now let us ſuppoſe the piſton puſhed down to the bottom of the barrel to which it applies cloſe; when it is drawn up to the top, it leaves a void behind, and the weight of the external air preſſes on the ſlip of bladder, which therefore claps cloſe to the braſs, and thus performs the part of a valve, and keeps it cloſe ſo that no air can enter. But the piſton having reached the top of the barrel, a hole F in the ſide of it is juſt below the piſton, and the air ruſhes through this hole and fills the barrel. Now puſh the piſton down again, it immediately paſſes the hole F, and no air eſcapes through it; it therefore forces open the valve at *f*, and eſcapes while the piſton moves to the bottom.

59
Its veſſel or receiver.

Now let E be any veſſel, ſuch as a glaſs bottle, having its mouth furniſhed with a braſs cap firmly cemented to it, having a hollow ſcrew which fits a ſolid ſcrew *p o*, turned on the cylindric nozzle of the ſyringe. Screw the ſyringe into this cap, and it is evident that the air forced out of the ſyringe will be accumulated in this veſſel: for upon drawing up the piſton the valve *f* always ſhuts by the elaſticity or expanding force of the air in E; and on puſhing it down again, the valve will open as ſoon as the piſton has got ſo far down that the air in the lower part of the barrel is more powerful than the air already in the veſſel. Thus at every ſtroke an additional barrelful of air will be forced into the veſſel E; and it will be found, that after every ſtroke the piſton muſt be farther puſhed down before the valve will open. It cannot open till the preſſure ariſing from the elaſticity of the air condenſed in the barrel is ſuperior to the elaſticity of the air condenſed in the veſſel; that is, till the condenſation of the firſt, or its denſity, is *ſomewhat* greater than that of the laſt, in order to overcome the ſtraining of the valve on the hole and the ſticking occaſioned by the clammy matter employed to make it air-tight.

60
A different conſtruction of this ſyringe.

Sometimes the ſyringe is conſtructed with a valve in the piſton. This piſton, inſtead of being of one piece and ſolid, conſiſts of two pieces perforated. The upper part *i k n m* is connected with the rod or handle, and has its lower part turned down to a ſmall cylinder, which is ſcrewed into the lower part *k l o n*; and has a perforation *g h* going up in the axis, and terminating in a hole *h* in one ſide of the rod, a piece of oiled leather is ſtrained acroſs the hole *g*. When the piſton is drawn up and a void left below it, the weight of the external air forces it through the hole *hg*, opens the valve *g*, and fills the barrel. Then, on puſhing down the piſton, the air being ſqueezed into leſs room, preſſes on the valve *g*, ſhuts it; and none eſcaping through the piſton, it is gradually condenſed as the piſton deſcends till it opens the valve *f*, and is added to that already accumulated in the veſſel E.

61
Elaſticity of the air increaſed by condenſation.

Having in this manner forced a quantity of air into the veſſel E, we can make many experiments in it in this ſtate of condenſation. We are chiefly concerned at preſent with the effect which this produces on its elaſticity. We ſee this to be greatly increaſed; for we find more and more force required for introducing every ſucceſſive barrelful. When the ſyringe is unſcrewed, we ſee the air ruſh out with great violence, and every indication of great expanding force. If the ſyringe be connected with the veſſel E in the ſame manner as the ſyringe in N° 17. viz. by interpoſing a ſtopcock B between them (ſee fig. 3.), and if this ſtopcock have a pipe at its extremity, reaching near to the bottom of the veſſel, which is previouſly half filled with water, we can obſerve diſtinctly when the elaſticity of the air in the ſyringe exceeds that of the air in the receiver: for the piſton muſt be puſhed down a certain length before the air from the ſyringe bubbles up through the water, and the piſton muſt be farther down at each ſucceſſive ſtroke before this appearance is obſerved. When the air has thus been accumulated in the receiver, it preſſes the ſides of it outward, and will burſt it if not ſtrong enough. It alſo preſſes on the ſurface of the water; and if we now ſhut the cock, unſcrew the ſyringe, and open the cock again, the air will force the water through the pipe with great velocity, cauſing it to riſe in a beautiful jet. When a metal-receiver is uſed, the condenſation may be puſhed to a great length, and the jet will then riſe to a great height; which gradually diminiſhes as the water is expended and room given to the air to expand itſelf. See the figure.

62
A method of judging of the condenſation, &c.

We judge of the condenſation of air in the veſſel E by the number of ſtrokes and the proportion of the capacity of the ſyringe to that of the veſſel. Suppoſe the firſt to be one-tenth of the laſt; then we know, that after 10 ſtrokes the quantity of air in the veſſel is doubled, and therefore its denſity double, and ſo on after any number of ſtrokes. Let the capacity of the ſyringe (when the piſton is drawn to the top) be a, and that of the veſſel be b, and the number of ſtrokes be n, the denſity of air in the veſſel will be $\frac{b+na}{b}$, or $1+\frac{na}{b}$.

63
not perfectly accurate.

But this is on the ſuppoſition that the piſton accurately fills the barrel, the bottom of the one applying cloſe to that of the other, and that no force is neceſſary for opening either of the valves: but the firſt cannot be inſured, and the laſt is very far from being true. In the conſtruction now deſcribed, it will require at leaſt one twentieth part of the ordinary preſſure of the air to open the piſton valve: therefore the air which gets in will want at leaſt this proportion of its complete elaſticity; and there is always a ſimilar part of the elaſticity employed in opening the nozzle valve. The condenſation therefore is never nearly equal to what is here determined.

64
A better method.

It is accurately enough meaſured by a gage fitted to the inſtrument. A glaſs tube GH of a cylindric bore, and cloſe at the end, is ſcrewed into the ſide of the cap on the mouth of the veſſel E. A ſmall drop of water or mercury is taken into this tube by warming it a little in the hand, which expands the contained air, ſo that when the open end is dipped into water, and the whole allowed to cool, the water advances a little into the tube. The tube is furniſhed with a ſcale divided into ſmall equal parts, numbered from the cloſe end of the tube. Since this tube communicates with the veſſel, it is evident that the condenſation will force the water along the tube, acting like a piſton on the air beyond it, and the air in the tube and veſſel will always be of one denſity. Suppoſe the number at which the drop ſtands before the condenſation is made to be c, and that it ſtands at d when the condenſation has attained the degree required, the denſity of the air in the remote end of the gage, and conſequently in the veſſel, will be $\frac{c}{d}$.

65
A variation of it.

Sometimes there is uſed any bit of tube cloſe at one end, having a drop of water in it, ſimply laid into the veſſel E, and furniſhed or not with a ſcale: but this can only be uſed with glaſs veſſels, and theſe are too weak to reſiſt the preſſure ariſing from great condenſation. In ſuch experiments metalline veſſels are uſed, fitted with a variety of apparatus for different experiments. Some of theſe will be occaſionally mentioned afterwards.

66
Syringes for great condenſations.

It muſt be obſerved in this place, that very great condenſations require great force, and therefore ſmall ſyringes. It is therefore convenient to have them of various ſizes, and to begin with thoſe of a larger diameter, which operate more quickly; and when the condenſation becomes fatiguing, to change the ſyringe for a ſmaller.

67
A ſtop-cock between the ſyringe and receiver.

For this reaſon, and in general to make the condenſing apparatus more convenient, it is proper to have a ſtop-cock interpoſed between the ſyringe and the veſſel, or as it is uſually called the receiver. This conſiſts of a braſs pipe, which has a well-ground cock in its middle, and has a hollow ſcrew at one end, which receives the nozzle ſcrew of the ſyringe, and a ſolid ſcrew at the other end, which fits the ſcrew of the receiver. See fig. 3.

68
Inſtances of great condenſation prove

By theſe gages, or contrivances ſimilar to them, we have been able to aſcertain very great degrees of condenſation in the courſe of ſome experiments. Dr Hales found, that when dry wood was put into a ſtrong veſſel, which it almoſt filled, and the remainder was filled with water, the ſwelling of the wood, occaſioned by its imbibition of water, condenſed the air of his gage into the thouſandth of its original bulk. He found that peaſe treated in the ſame way generated elaſtic air, which preſſing on the air in the gage condenſed it into the fifteen hundredth part of its bulk. This is the greateſt condenſation that has been aſcertained with preciſion, although in other experiments it has certainly been carried much farther; but the preciſe degree could not be aſcertained.

69
air and water to be eſſentially different;

The only uſe to be made of this obſervation at preſent is, that ſince we have been able to exhibit air in a denſity a thouſand times greater than the ordinary denſity of the air we breathe, it cannot, as ſome imagine, be only a different form of water; for in this ſtate it is as denſe or denſer than water, and yet retains its great expanſibility.

70
and ſhow the error of ſome opinions reſpecting elaſticity, &c.

Another important obſervation is, that in every ſtate of denſity in which we find it, it retains its perfect fluidity, tranſmitting all preſſures which are applied to it with undiminiſhed force, as appears by the equality conſtantly obſerved between the oppoſing columns of water or other fluid by which it is compreſſed, and by the facility with which all motions are performed in it in the moſt compreſſed ſtates in which we can make obſervations of this kind. This fact is totally incompatible with the opinion of thoſe who aſcribe the elaſticity of air to the ſpringy ramified ſtructure of its particles, touching each other like ſo many pieces of ſponge or foot-balls. A collection of ſuch particles might indeed be pervaded by ſolid bodies with conſiderable eaſe, if they were merely touching each other, and not ſubjected to any external preſſure. But the moment ſuch preſſure is exerted, and the aſſemblage ſqueezed into a ſmaller ſpace, each preſſes on its adjoining particles: they are individually compreſſed, flattened in their touching ſurfaces, and *before the denſity is doubled* they are ſqueezed into the form of perfect cubes, and compoſe a maſs, which may indeed propagate preſſure from one place to another in an imperfect manner, and with great diminution of its intenſity, but will no more be fluid than a maſs of ſoft clay. It will be of uſe to keep this obſervation in mind.

71 onſequences of the ir's elaſticity.

We have ſeen the air is heavy and compreſſible, and might now proceed to deduce in order the explanation of the appearances conſequent on each of theſe properties. But, as has been already obſerved, the elaſticity of air modifies the effects of its gravity ſo remarkably, that they would be imperfectly underſtood if both qualities were not combined in our conſideration of either. At any rate, ſome farther conſequences of its elaſticity muſt be conſidered, before we underſtand the means of varying at pleaſure the effects of its gravity.

72 ts great xpanſibility

Since air is heavy, the lower ſtrata of a maſs of air muſt ſupport the upper; and, being compreſſible, they muſt be condenſed by their weight. In this ſtate of compreſſion the elaſticity of the lower ſtrata of air acts in oppoſition to the weight of the incumbent air, and balances it. There is no reaſon which would make us ſuppoſe that its expanding force belongs to it only when in ſuch a ſtate of compreſſion. It is more probable, that, if we could free it from this preſſure, the air would expand itſelf into ſtill greater bulk. This is moſt diſtinctly ſeen in the following experiment.

73 proved by experiment Fig. 11.

Into the cylindric jar ABCD (fig. 11.) which has a ſmall hole in its bottom, and is furniſhed with an air-tight piſton E, put a ſmall flaccid bladder, having its mouth tied tight with a ſtring. Having puſhed the piſton near to the bottom, and noticed the ſtate of the bladder, ſtop up the hole in the bottom of the jar with the finger, and draw up the piſton, which will require a conſiderable force. You will obſerve the bladder ſwell out, as if air had been blown into it; and it will again collapſe on allowing the piſton to deſcend. Nothing can be more unexceptionable than the concluſion from this experiment, that ordinary air is in a ſtate of compreſſion, and that its elaſticity is not limited to this ſtate. The bladder being flaccid, ſhows that the included air is in the ſame ſtate with the air which ſurrounds it; and the ſame muſt be affirmed of it while it ſwells but ſtill remains flaccid. We muſt conclude, that the whole air within the veſſel expands, and continues to fill it, when its capacity has been enlarged. And ſince this is obſerved to go on as long as we give it more room, we conclude, that by ſuch experiments we have not yet given it ſo much room as it can occupy.

74 Attempts to diſcover the limits of this expanſion by

It was a natural object of curioſity to diſcover the limits of this expanſion; to know what was the natural unconſtrained bulk of a quantity of air, beyond which it would not expand though all external compreſſing force were removed. Accordingly philoſophers conſtructed inſtruments for *rarefying* the air. The common water pump had been long familiar, and appeared very proper for this purpoſe. The moſt obvious is the following.

75 a ſyringe; Fig. 12.

Let the barrel of the ſyringe AB (fig. 12.) communicate with the veſſel V, with a ſtopcock C between them. Let it commuinicate with the external air by another orifice D, in any convenient ſituation, alſo furniſhed with a ſtopcock. Let this ſyringe have a piſton very accurately fitted to it ſo as to touch the bottom all over when puſhed down, and have no vacancy about the ſides.

76 from the operation of which

Now, ſuppoſe the piſton at the bottom, the cock C open, and the cock D ſhut, draw the piſton to the top. The air which filled the veſſel V will expand ſo as to fill both that veſſel and the barrel AB; and as no reaſon can be given to the contrary, we muſt ſuppoſe that the air will be uniformly diffuſed through both. Calling V and B the capacity of the veſſel and barrel, it is plain that the bulk of the air will now be V+B; and ſince the quantity of matter remains the ſame, and the denſity of a fluid is as its quantity of matter directly and its bulk inverſely, the denſity of the expanded air will be $\frac{V}{V+B}$, the denſity of common air being 1: for $V+B : V = 1 : \frac{V}{V+B}$.

77 we infer the diminution of the elaſticity of expanded air,

The piſton requires force to raiſe it, and it is raiſed in oppoſition to the preſſure of the incumbent atmoſphere; for this had formerly been balanced by the elaſticity of the common air: and we conclude from the fact, *that force is required to raiſe the piſton*, that the elaſticity of the expanded air is leſs than that of air in its ordinary ſtate; and an accurate obſervation of the force neceſſary to raiſe it would ſhow how much the elaſticity is diminiſhed. When therefore the piſton is let go, it will deſcend as long as the preſſure of the atmoſphere exceeds the elaſticity of the air in the barrel; that is, till the air in the barrel is in a ſtate of ordinary denſity. To put it further down will require force, becauſe the air muſt be compreſſed in the barrel; but if we open the cock D, the air will be expelled through it, and the piſton will reach the bottom.

78 and calculate its denſity.

Now ſhut the *diſcharging cock* D, and open the cock C, and draw up the piſton. The air which occupied the ſpace V, with the denſity $\frac{V}{V+B}$, will now occupy the ſpace V+B, if it expands ſo far. To have its denſity D, ſay, As its preſent bulk V+B is to its former bulk V, ſo is its former denſity $\frac{V}{V+B}$ to its new denſity; which will therefore be $\frac{V+V}{\overline{V+B}\times\overline{V+B}}$, or $\left.\overline{\frac{V}{V+B}}\right|^{2}$.

79

It is evident, that if the air continues to expand, the denſity of the air in the veſſel after the third drawing up of the piſton will be $\left.\overline{\frac{V}{V+B}}\right|^{3}$, after the fourth it will be $\left.\overline{\frac{V}{V+B}}\right|^{4}$, and after any number of ſtrokes n will be $\left.\overline{\frac{V}{V+B}}\right|^{n}$. Thus, if the veſſel is four times as large as the barrel, the denſity after the fifth ſtroke will be $\frac{1024}{3125}$, nearly $\frac{1}{3}$ of its ordinary denſity.

80

On the other hand, the number n of ſtrokes neceſſary for reducing air to the denſity D is $\frac{\text{Log D}}{\text{Log V}-\text{Log }(\overline{V+B})}$.

81 Some inconveniences of this inſtrument.

Thus we ſee that this inſtrument can never abſtract the whole air in conſequence of its expanſion, but only rarefy it continually as long as it continues to expand; nay, there is a limit beyond which the rarefaction cannot go. When the piſton has reached the bottom, there remains a ſmall ſpace between it and the cock C filled with common air. When the piſton is drawn up, this ſmall quantity of air expands, and alſo a ſimilar quantity in the neck of the other cock; and no air will come out of the receiver V till the expanded air in the barrel is of a ſmaller denſity than the air in the receiver. This circumſtance evidently directs us to make theſe two ſpaces as ſmall as poſſible, or by ſome contrivance to fill them up altogether. Perhaps this may be done effectually in the following manner.

82 Remedied by another, Fig. 13.

Let BE (fig. 13.) repreſent the bottom of the barrel, and let the circle HKI be the ſection of the key of the cock, of a large diameter, and place it as near to the barrel as can be. Let this communicate with the barrel by means of a hole FG widening upwards, as the fruſtum of a hollow obtuſe cone. Let the bottom of the piſton *b f h g e* be ſhaped ſo as to fit the bottom of the barrel and this hole exactly. Let the cock be pierced with two holes. One of them, HI, paſſes, perpendicularly through its axis, and forms the communication between the receiver and barrel. The other hole, KL, has one extremity K on the ſame circumference with H, ſo that when the key is turned a fourth part round, K will come into the place of H: but this hole is pierced obliquely into the key, and thus keeps clear of the hole HI. It goes no further than the axis, where it communicates with a hole bored along the axis and terminating at its extremity. This hole forms the communication with the external air, and ſerves for diſcharging the air in the barrel. (A ſide view of the key is ſeen in fig. 14.). Fig. 12. ſhows the poſition of the cock while the piſton is moving upwards, and fig. 14. ſhows its poſition while the piſton is moving downwards. When the piſton has reached the bottom, the conical piece *f h g* of the piſton, which may be of firm leather, fills the hole FHG, and therefore completely expels the air from the barrel. The canal KL*l* of the cock contains air of the common denſity; but this is turned aſide into the poſition KL (fig. 13.), while the piſton is ſtill touching the cock. It cannot extend into the barrel during the aſcent of the piſton. In place of it the perforation HLI comes under the piſton, filled with air that had been turned aſide with it when the piſton was at the top of the barrel, and therefore of the ſame denſity with the air of the receiver. It appears therefore that there is no limit to the rarefaction as long as the air will expand. Fig. 14.

83 called an *exhauſting ſyringe.*

This inſtrument is called an Exhausting Syringe. It is more generally made in another form, which is much leſs expenſive, and more convenient in its uſe. Inſtead of being furniſhed with *cocks* for eſtabliſhing the communications and ſhutting them, as is neceſſary, it has *valves* like thoſe of the condenſing ſyringe, but opening in the oppoſite direction. It is thus made:

84 Its conſtruction and Fig. 15.

The pipe of communication or conduit MN (fig. 15.) has a male ſcrew in its extremity, and over this is tied a ſlip of bladder or leather M. The lower half of the piſton has alſo a male ſcrew on it, covered at the end with a ſlip of bladder O. This is ſcrewed into the upper half of the piſton, which is pierced with a hole H coming out of the ſide of the rod.

85 operation.

Now ſuppoſe the ſyringe ſcrewed to the conducting pipe, and that ſcrewed into the receiver V, and the piſton at the bottom of the barrel. When the piſton is drawn up, the preſſure of the external air ſhuts the valve O, and a void is left below the piſton: there is therefore no preſſure on the upper ſide of the valve M to balance the elaſticity of the air in the receiver which formerly balanced the weight of the atmoſphere. The air therefore in the receiver lifts this valve, and diſtributes itſelf between the veſſel and the barrel; ſo that when the piſton has reached the top the denſity of the air in both receiver and barrel is as before $\frac{V.}{V+B}$.

86 When the piſton is let go it deſcends, becauſe the elaſticity of the expanded air is not a balance for the preſſure of the atmoſphere, which therefore preſſes down the piſton with the difference, keeping the piſton-valve ſhut all the while. At the ſame time the valve M alſo ſhuts: for it was opened by the prevailing elaſticity of the air in the receiver, and while it is open the two airs have equal denſity and elaſticity; but the moment the piſton deſcends, the capacity of the barrel is diminiſhed, the elaſticity of its air increaſes by collapſing, and now prevailing over that of the air in the receiver ſhuts the valve M.

87 When it has arrived at ſuch a part of the barrel that the air in it is of the denſity of the external air, there is no force to puſh it farther down; the hand muſt therefore preſs it. This attempts to condenſe the air in the barrel, and therefore increaſes its elaſticity; ſo that it lifts the valve O and eſcapes, and the piſton gets to the bottom. When drawn up again, greater force is required than the laſt time, becauſe the elaſticity of the included air is leſs than in the former ſtroke. The piſton riſes further before the valve M is lifted up, and when it has reached the top of the barrel the denſity of the included air is $\overline{\frac{V}{V+B}}\Big|^{4}$. The piſton, when let go, will deſcend further than it did before ere the piſton-valve open, and the preſſure of the hand will again puſh it to the bottom, all the air eſcaping through O. The rarefaction will go on at every ſucceſſive ſtroke in the ſame manner as with the other ſyringe.

88 Advantages of this ſyringe over the former, and

This ſyringe is evidently more eaſy in its uſe, requiring no attendance to the cocks to open and ſhut them at the proper times. On this account this conſtruction of an exhauſting ſyringe is much more generally uſed.

89 its inferiority.

But it is greatly inferior to the ſyringe with cocks with reſpect to its power of rarefaction. Its operation is greatly limited. It is evident that no air will come out of the receiver unleſs its elaſticity *exceed* that of the air in the barrel by a difference able to lift up the valve M. A piece of oiled leather tied acroſs this hole can hardly be made tight and certain of clapping to the hole without ſome ſmall ſtraining, which muſt therefore be overcome. It muſt be very gentle indeed not to require a force equal to the weight of two inches of water, and this is equal to about the 200th part of the whole elaſticity of the ordinary air; and therefore this ſyringe, for this reaſon alone, cannot rarefy air above 200 times, even though air were capable of an indefinite expanſion. In like manner the valve O cannot be raiſed without a ſimilar prevalence of the elaſticity of the air in the barrel above the weight of the atmoſphere. Theſe cauſes united, make it difficult to rarefy the air more than 100 times, and very few ſuch ſyringes will rarefy it more than 50 times; whereas the ſyringe with cocks, when new and in good order, will rarefy it 1000 times.

90 e former ever, go out order.

But, on the other hand, ſyringes with cocks are much more expenſive, eſpecially when furniſhed with apparatus for opening and ſhutting the cocks. They are more difficult to make equally tight, and (which is the greateſt objection) do not remain long in good order. The cocks, by ſo frequently opening and ſhutting, grow looſe, and allow the air to eſcape. No method has been found of preventing this. They muſt be ground tight by means of emery or other cutting powders. Some of theſe unavoidably ſtick in the metal, and continue to wear it down. For this reaſon philoſophers, and the makers of philoſophical inſtruments, have turned their chief attention to the improvement of the ſyringe with valves. We have been thus minute in the account of the operation of rarefaction, that the reader may better underſtand the value of theſe improvements, and in general the operation of the principal pneumatic engines.

Of the Air-Pump.

91 vention the air- by ericke.

An Air-Pump is nothing but an exhauſting ſyringe accommodated to a variety of experiments. It was firſt invented by Otto Guericke, a gentleman of Magdeburgh in Germany, about the year 1654. We truſt that it will not be unacceptable to our readers to ſee this inſtrument, which now makes a principal article in a philoſophical apparatus, in its firſt form, and to trace it through its ſucceſſive ſteps to its preſent ſtate of improvement.

Guericke, indifferent about the ſolitary poſſeſſion of an invention which gave entertainment to numbers who came to ſee his wonderful experiments, gave a minute deſcription of all his pneumatic apparatus to Gaſpar Schottus profeſſor of mathematics at Wirtemberg, who immediately publiſhed it with the author's conſent, with an account of ſome of its performances, firſt in 1657, in his *Mechanica Hydraulico-pneumatica*; and then in his *Technica Curioſa*, in 1664, a curious collection of all the wonderful performances of art which he collected by a correſpondence over all Europe.

92 onſtruc- on of his mp. Fig. 16.

Otto Guericke's air-pump conſiſts of a glaſs receiver A (fig. 16.) of a form nearly ſpherical, fitted up with a braſs cap and cock B. The nozzle of the cap was fixed to a ſyringe CDE, alſo of braſs, bent at D into half a right angle. This had a valve at D, opening from the receiver into the ſyringe, and ſhutting when preſſed in the oppoſite direction. In the upper ſide of the ſyringe there is another valve F, opening from the ſyringe into the external air, and ſhutting when preſſed inwards. The piſton had no valve. The ſyringe, the cock B, and the joint of the tube, were immerſed in a ciſtern filled with water. From this deſcription it is eaſy to underſtand the operation of the inſtrument. When the piſton was drawn up from the bottom of the ſyringe, the valve F was kept ſhut by the preſſure of the external air, and the valve D opened by the elaſticity of the air in the receiver. When it was puſhed down again, the valve D immediately ſhut by the ſuperior elaſticity of the air in the ſyringe; and when this was ſufficiently compreſſed, it opened the valve F, and was diſcharged. It was immerſed in water, that no air might find its way through the joints or cocks.

93 Its imperfections.

It would ſeem that this machine was not very perfect, for Guericke ſays that it took ſeveral hours to produce an evacuation of a moderate ſized veſſel; but he ſays, that when it was in good order, the rarefaction (for he acknowledges that it was not, nor could be, a complete evacuation) was ſo great, that when the cock was opened, and water admitted, it filled the receiver ſo as ſometimes to leave no more than the bulk of a pea filled with air. This is a little ſurpriſing; for if the valve F be placed as far from the bottom of the ſyringe as in Schottus's figure, it would appear that the rarefaction could not be greater than what muſt ariſe from the air in DF expanding till it filled the whole ſyringe: becauſe as ſoon as the piſton in its deſcent paſſes F it can diſcharge no more air, but muſt compreſs it between F and the bottom, to be expanded again when the piſton is drawn up. It is probable that the piſton was not very tight, but that on preſſing it down it allowed the air to paſs it; and the water in which the whole was immerſed prevented the return of the air when it was drawn up again: and this accounts for the great time neceſſary for producing the deſired rarefaction.

94 His improvement of it.

Fig. 17.

Guericke, being a gentleman of fortune, ſpared no expence, and added a part to the machine, which ſaved his numerous viſitants the trouble of hours attendance before they could ſee the curious experiments with the rarefied air. He made a large copper veſſel G (fig. 17.), having a pipe and cock below, which paſſed through the floor of the chamber into an under apartment, where it was joined to the ſyringe immerſed in the ciſtern of water, and worked by a lever. The upper part of the veſſel terminated in a pipe, furniſhed with a ſtopcock H, ſurrounded with a ſmall brim to hold water for preventing the ingreſs of air. On the top was another cap I, alſo filled with water, to protect the junction of the pipes with the receiver K. This great veſſel was always kept exhauſted, and workmen attended below. When experiments were to be performed in the receiver K, it was ſet on the top of the great veſſel, and the cock H was opened. The air in K immediately diffuſed itſelf equally between the two veſſels, and was ſo much more rarefied as the receiver K was ſmaller than the veſſel G. When this rarefaction was not ſufficient, the attendants below immediately worked the pump.

Theſe particulars deſerve to be recorded, as they ſhow the inventive genius of this celebrated philoſopher, and becauſe they are uſeful even in the preſent advanced ſtate of the ſtudy. Guericke's method of excluding air from all the joints of his apparatus, by immerſing theſe joints in water, is the only method that has to this day been found effectual; and there frequently occur experiments where this excluſion for a long time is abſolutely neceſſary. In ſuch caſes it is neceſſary to conſtruct little cups or ciſterns at every joint, and to fill them with water or oil. In a letter to Schottus, 1662-3, he deſcribes very ingenious contrivances for producing complete rarefaction after the elaſticity of the remaining air has been ſo far diminiſhed that it is not able to open the valves. He opens the exhauſting valves by a plug, which is puſhed in by the hand; and the diſcharging valve is opened by a ſmall pump placed on its outſide, ſo that it opens into a void inſtead of opening againſt the preſſure of the atmoſphere. (See *Schotti Technica Curioſa*, p. 68. 70.). Theſe contrivances have been lately added to air-pumps by Haas and Hurter as new inventions.

It muſt be acknowledged, that the application of the pump or ſyringe to the exhauſtion of air was a very obvious thought on the principle exhibited in N° 17. and in this way it was alſo employed by Guericke, who firſt filled the receiver with water, and then applied the ſyringe. But this was by no means either his object or his principle.

95 Merits of Guericke.

His object was not ſolely to procure a veſſel void of air, but to exhauſt the air which was already in it; and his principle was the power which he ſuſpected to be in air of expanding itſelf into a greater ſpace when the force was removed which he ſuppoſed to compreſs it. He expreſsly ſays (*Tract. de Experimentis Magdeburgicis, et in Epiſt. ad Schottum*), that the contrivance occurred to him accidentally when occupied with experiments in the Toricellian tube, in which he found that the air would really expand, and completely fill a much larger ſpace than what it uſually occupied, and that he had found no limits to the expanſion, evincing this by facts which we ſhall perfectly underſtand by and by. This was a doctrine quite new, and required a philoſophical mind to view it in a general and ſyſtematic manner; and it muſt be owned that his manner of treating the ſubject is equally remarkable for ingenuity and for modeſty. (*Epiſt. ad Schottum*).

96 Progreſs of experimental philoſophy.

His doctrine and his machine were ſoon ſpread over Europe. It was the age of literary ardour and philoſophical curioſity; and it is moſt pleaſant to us, who, ſtanding on the ſhoulders of our predeceſſors, can ſee far around us, to obſerve the eagerneſs with which every new, and to us frivolous, experiment was repeated and canvaſſed. The worſhippers of Ariſtotle were daily receiving ſevere mortifications from the experimenters, or empirics as they affected to call them, and they exerted themſelves ſtrenuouſly in ſupport of his now tottering cauſe. This contributed to the rapid propagation of every diſcovery; and it was a moſt profitable and reſpectable buſineſs to go through the chief cities of Germany and France exhibiting philoſophical experiments.

97 Ardour of Mr Boyle

About this time the foundations of the Royal Society of London were laid. Mr Boyle, Mr Wren, Lord Brounker, Dr Wallis, and other curious gentlemen, held meetings at Oxford, in which were received accounts of whatever was doing in the ſtudy of nature; and many experiments were exhibited. The reſearches of Galileo, Toricelli, and Paſchal, concerning the preſſure of the air, greatly engaged their attention, and many additions were made to their diſcoveries. Mr Boyle, the moſt ardent and ſucceſsful ſtudier of nature, had the principal ſhare in theſe improvements, his inquiſitive mind being aided by an opulent fortune. In a letter to his nephew Lord Dungarvon, he ſays that he had made many attempts to ſee the appearances exhibited by bodies freed from the preſſure of the air. He had made Toricellian tubes, having a ſmall veſſel a-top, into which he put ſome bodies before filling the tubes with mercury; ſo that when the tube was ſet upright, and the mercury run out, the bodies were *in vacuo*. He had alſo abſtracted the water from a veſſel, by a ſmall pump, by means of its weight, in the manner deſcribed in N° 17, having previouſly put bodies into the veſſel along with the water. But all theſe ways were very troubleſome and imperfect. He was delighted when he learned from Schottus's firſt publication, that Counſellor Guericke had effected this by the expanſive power of the air; and immediately ſet about conſtructing a machine from his own ideas, no deſcription of Guericke's being then publiſhed.

Plate cccxxv. Fig. 18.

98 His air-pump.

It conſiſted of a receiver A (fig. 18.), furniſhed with a ſtopcock B, and ſyringe CD placed in a vertical poſition below the receiver. Its valve C was in its bottom, cloſe adjoining to the entry of the pipe of communication; and the hole by which the air iſſued was farther ſecured by a plug which could be removed. The piſton was moved by a wheel and rackwork. The receiver of Guericke's pump was but ill adapted for any conſiderable variety of experiments; and accordingly very few were made in it. Mr Boyle's receiver had a large opening EF, with a ſtrong glaſs margin. To this was fitted a ſtrong braſs cap, pierced with a hole G in its middle, to which was fitted a plug ground into it, and ſhaped like the key of a cock. The extremity of this key was furniſhed with a ſcrew, to which could be affixed a hook, or a variety of pieces for ſupporting what was to be examined in the receiver, or for producing various motions within it, without admitting the air. This was farther guarded againſt by means of oil poured round the key, where it was retained by the hollow cup-like form of the cover. With all theſe precautions, however, Mr Boyle ingenuouſly confeſſes, that it was but ſeldom, and with great difficulty, that he could produce an extreme degree of rarefaction; and it appears by Guericke's letter to Schottus, that in this reſpect the Magdeburgh machine had the advantage. But moſt of Boyle's very intereſting experiments did not require this extreme rarefaction; and the variety of them, and their philoſophic importance, compenſated for this defect, and ſoon eclipſed the fame of the inventor to ſuch a degree, that the ſtate of air in the receiver was generally denominated the *vacuum Boyleanum*, and the air-pump was called *machina Boyleana*. It does not appear that Guericke was at all ſolicitous to maintain his claim to priority of invention. He appears to have been of a truly noble and philoſophical mind, aiming at nothing but the advancement of ſcience.

99 His contrivances to make air-veſſels tight.

Mr Boyle found, that to make a veſſel air-tight, it was ſufficient to place a piece of wet or oiled leather on its brim, and to lay a flat plate of metal upon this. The preſſure of the external air ſqueezed the two ſolid bodies ſo hard together, that the ſoft leather effectually excluded it. This enabled him to render the whole machine incomparably more convenient for a variety of experiments. He cauſed the conduit-pipe to terminate in a flat plate which he covered with leather, and on this he ſet the glaſs ball or receiver, which had both its upper and lower brim ground flat. He covered the upper orifice in like manner with a piece of oiled leather and a flat plate, having cocks and a variety of other perforations and contrivances ſuited to his purpoſes. This he found infinitely more expeditious, and alſo tighter, than the clammy cements which he had formerly uſed for ſecuring the joints.

100 Dr Hooke's improvement of Boyle's air-pump.

He was now aſſiſted by Dr Hooke, the moſt ingenious and inventive mechanic that the world has ever ſeen. This perſon made a great improvement on the air-pump, by applying two ſyringes whoſe piſton-rods were worked

Air-pump [illegible] Fig. 20. by the same wheel, as in fig. 20. and putting valves in the piſtons in the ſame manner as in the piſton of a common pump. This evidently doubled the expedition of the pump's operation; but it alſo greatly diminiſhed the labour of pumping: for it muſt be obſerved, that the piſton H muſt be drawn up againſt the preſſure of the external air, and when the rarefaction is nearly perfect this requires a force of nearly 15 pounds for every inch of the area of the piſton. Now when one piſton H is at the bottom of the barrel, the other K is at the top of the barrel, and the air below K is equally rare with that in the receiver. Therefore the preſſure of the external air on the piſton K is *nearly* equal to that on the piſton H. Both, therefore, are acting in oppoſite directions on the wheel which gave them motion; and the force neceſſary for raiſing H is only the difference between the elaſticity of the air in the barrel H and that of the air in the barrel K. This is very ſmall in the beginning of the ſtroke, but gradually increaſes as the piſton K deſcends, and becomes equal to the whole exceſs of the air's preſſure above the elaſticity of the remaining air of the receiver when the air at K of the natural denſity begins to open the piſton valves. An accurate attention to the circumſtances will ſhow us that the force requiſite for working the pump is greateſt at firſt, and gradually diminiſhes as the rarefaction advances; and when this is nearly complete, hardly any more force is required than what is neceſſary for overcoming the friction of the piſtons, except during the diſcharge of the air at the end of each ſtroke.

101 Generally adopted. This is therefore the form of the air-pump which is moſt generally uſed all over Europe. Some traces of national prepoſſeſſion remain. In Germany, air-pumps are frequently made after the original model of Guericke's (Wolff Cyclomatheſis); and the French generally uſe the pump made by Papin, though extremely aukward. We ſhall give a deſcription of Boyle's air-pump as finally improved by Hawkeſbee, which, with ſome ſmall accommodations to particular views, ſtill remains the moſt approved form.

102 Hawkeſbee's improvements. Fig. 19. Here follows the deſcription from Deſaguliers.

It conſiſts of two braſs barrels *aa, aa* (fig. 19.), 12 inches high and 2 wide. The piſtons are raiſed and depreſſed by turning the winch *bb*. This is faſtened to an axis paſſing through a ſtrong toothed wheel, which lays hold of the teeth of the racks *cccc*. Then the one is raiſed while the other is depreſſed; by which means the valves, which are made of limber bladder, fixed in the upper part of each piſton, as well as in the openings into the bottom of the barrels, perform their office of diſcharging the air from the barrels, and admitting into them the air from the receiver to be afterwards diſcharged; and when the receiver comes to be pretty well exhauſted of its air, the preſſure of the atmoſphere in the deſcending piſton is nearly ſo great, that the power required to raiſe the other is little more than is neceſſary for overcoming the friction of the piſton, which renders this pump preferable to all others, which require more force to work them as the rarefaction of the air in the receiver advances.

103 Barrels. The barrels are ſet in a braſs diſh about two inches deep, filled with water or oil to prevent the inſinuation of air. The barrels are ſcrewed tight down by the nuts *ee, ee*, which force the frontiſpiece *ff* down on them, through which the two pillars *gg, gg* paſs.

104 Air-pump. Braſs pipe, &c. From between the barrels riſes a ſlender braſs pipe *kk*, communicating with each by a perforation in the tranſverſe piece of braſs on which they ſtand. The upper end of this pipe communicates with another perforated piece of braſs, which ſcrews on underneath the plate *i i i i*, of ten inches diameter, and ſurrounded with a braſs rim to prevent the ſhedding of water uſed in ſome experiments. This piece of braſs has three branches: 1ſt, An horizontal one communicating with the conduit pipe *h h*. 2d, An upright one ſcrewed into the middle of the pump-plate, and terminating in a ſmall pipe *k*, riſing about an inch above it. 3d, A perpendicular one, looking downwards in the continuation of the pipe *k*, and having a hollow ſcrew in its end receiving the braſs cap of the gage-pipe *l l l l*, which is of glaſs, 34 inches long, and immerſed in a glaſs ciſtern *m m* filled with mercury. This is covered a-top with a cork float, carrying the weight of a light wooden ſcale divided into inches, which are numbered from the ſurface of the mercury in the ciſtern. This ſcale will therefore riſe and fall with the mercury in the ciſtern, and indicate the true elevation of that in the tube.

105 Stopcock. There is a ſtopcock immediately above the inſertion of the gage-pipe, by which its communication may be cut off. There is another at *n*, by which a communication is opened with the external air, for allowing its readmiſſion; and there is ſometimes another immediately within the inſertion of the conduct-pipe for cutting off the communication between the receiver and the pump. This is particularly uſeful when the rarefaction is to be continued long, as there are by theſe means fewer chances of the inſinuation of air by the many joints.

106 Receivers. The receivers are made tight by ſimply ſetting them on the pump-plate with a piece of wet or oiled leather between; and the receivers which are open a-top, have a braſs cover ſet on them in the ſame manner. In theſe covers there are various perforations and contrivances for various purpoſes. The one in the figure has a ſlip wire paſſing through a collar of oiled leather, having a hook or a ſcrew in its lower end for hanging any thing on or producing a variety of motions.

107 Contrivance for removing them. Sometimes the receivers are ſet on another plate, which has a pipe ſcrewed into its middle, furniſhed with a ſtopcock and a ſcrew, which fits the middle pipe *k*. When the rarefaction has been made in it, the cock is ſhut, and then the whole may be unſcrewed from the pump, and removed to any convenient place. This is called a *tranſporter plate*.

108 Principle upon which the gage is conſtructed, It only remains to explain the gage *l l l l*. In the ordinary ſtate of the air its elaſticity balances the preſſure of the incumbent atmoſphere. We find this from the force that is neceſſary to ſqueeze it into leſs bulk, in oppoſition to this elaſticity. Therefore the elaſticity of the air increaſes with the vicinity of its particles. It is therefore reaſonable to expect, that when we allow it to occupy more room, and its particles are farther aſunder, its elaſticity will be diminiſhed though not annihilated; that is, it will no longer balance the whole preſſure of the atmoſphere, though it may ſtill balance part of it. If therefore an upright pipe have its lower end immerſed in a veſſel of mercury, and communicate by its upper end with a veſſel containing rarefied, therefore leſs elaſtic, air, we ſhould expect that the preſſure of the air will prevail, and force the mercury into the tube, and cauſe it to riſe to ſuch a height that

the weight of the mercury, joined to the elaſticity of the rarefied air acting on its upper ſurface, ſhall be exactly equal to the whole preſſure of the atmoſphere. The height of the mercury is the exact meaſure of that part of the whole preſſure which is not balanced by the elaſticity of the rarefied air, and its deficiency from the height of the mercury in the Toricellian tube is the exact meaſure of this remaining elaſticity.

109
[illegible] in- [illegible] the [illegible] of [illegible]action.

It is evident therefore, that the pipe will be a ſcale of the elaſticity of the remaining air, and will indicate in ſome ſort the degree of rarefaction: for there muſt be ſome analogy between the denſity of the air and its elaſticity; and we have no reaſon to imagine that they do not increaſe and diminiſh together, although we may be ignorant of the law, that is, of the change of elaſticity correſponding to a known change of denſity. This is to be diſcovered by experiment; and the air-pump itſelf furniſhes us with the beſt experiments for this purpoſe. After rarefying till the mercury in the gage has attained half the height of that in the Toricellian tube, ſhut the communication with the barrels and gage, and admit the water into the receiver. It will go in till all is again in equilibrio with the preſſure of the atmoſphere; that is, till the air in the receiver has collapſed into its natural bulk. This we can accurately meaſure, and compare with the whole capacity of the receiver; and thus obtain the preciſe degree of rarefaction correſponding to half the natural elaſticity. We can do the ſame thing with the elaſticity reduced to one third, one fourth, &c. and thus diſcover the whole law.

110
Inconveniences of this gage,

This gage muſt be conſidered as one of the moſt ingenious and convenient parts of Hawkeſbee's pump; and it is well diſpoſed, being in a ſituation protected againſt accidents: but it neceſſarily increaſes greatly the ſize of the machine, and cannot be applied to the table-pump, repreſented in fig. 20. When it is wanted here, a ſmall plate is added behind, or between the barrels and receiver; and on this is ſet a ſmall tubulated (as it is termed) receiver, covering a common weather-glaſs tube.—This receiver being rarefied along with the other, the preſſure on the mercury in the ciſtern ariſing from the elaſticity of the remaining air is diminiſhed ſo as to be no longer able to ſupport the mercury at its full height; and it therefore deſcends till the height at which it ſtands puts it in equilibrio with the elaſticity. In this form, therefore, the height of the mercury is directly a meaſure of the remaining elaſticity; while in the other it meaſures the remaining unbalanced preſſure of the atmoſphere. But this gage is extremely cumberſome, and liable to accidents. We are ſeldom much intereſted in the rarefaction till it is great: a contracted form of this gage is therefore very uſeful, and was early uſed.

Fig. 20.

111
remedied.
Fig. 21.

A ſyphon ABCD (fig. 21.), each branch of which is about four inches long, cloſe at A and open at D, is filled with boiling mercury till it occupies the branch AB and a very ſmall part of CD, having its ſurface at O. This is fixed to a ſmall ſtand, and fixed into the receiver, along with the things that are to be exhibited in the rarefied air. When the air has been rarefied till its remaining elaſticity is not able to ſupport the column BA, the mercury deſcends in AB, and riſes in CD, and the remaining elaſticity will always be meaſured by the elevation of the mercury in AB above that in the leg CD. Could the exhauſtion be perfected, the ſurfaces in both legs would be on a level. Another gage might be put into the ſame foot, having a ſmall bubble of air at A. This would move from the beginning of the rarefaction; but our ignorance of the analogy between the denſity and elaſticity hinders us from uſing it as a meaſure of either.

It is enough for our preſent purpoſe to obſerve, that the barometer or ſyphon gage is a perfect indication and meaſure of the performance of an air-pump, and that a pump is (*cæteris paribus*) ſo much the more perfect, as it is able to raiſe the mercury higher in the gage.

112
A complete exhauſtion not effected by the air-pump.

It is in this way that we diſcover that none can produce a complete exhauſtion, and that their operation is only a very great rarefaction: for none can raiſe the mercury to that height at which it ſtands in the Toricellian tube, well purged of air. Few pumps will bring it within one-tenth of an inch. Hawkeſbee's, fitted up according to his inſtructions, will ſeldom bring it within one-fifth. Pumps with cocks, when conſtructed according to the principles mentioned when ſpeaking of the exhauſting ſyringe, and new and in fine order, will in favourable circumſtances bring it within one-fortieth. None with valves fitted up with wet leather, or when water or volatile fluids are allowed acceſs into any part, will bring it nearer than one-fifth. Nay, a pump of the beſt kind, and in the fineſt order, will have its rarefying power reduced to the loweſt ſtandard, as meaſured by this gage, if we put into the receiver the tenth part of a ſquare inch of white ſheep-ſkin, freſh from the ſhops, or of any ſubſtance equally damp. This is a diſcovery made by means of the improved air-pump, and leads to very extenſive and important conſequences in general phyſics; ſome of which will be treated of under this article: and the obſervation is made thus early, that our readers may better underſtand the improvements which have been made on this celebrated machine.

113
Various improvements of this machine,

It would require a volume to deſcribe all the changes which have been made on it. An inſtrument of ſuch multifarious uſe, and in the hands of curious men, each diving into the ſecrets of nature in his favourite line, muſt have received many alterations and real improvements in many particular reſpects. But theſe are beſide our preſent purpoſe; which is to conſider it merely as a machine for rarefying elaſtic or expanſive fluids. We muſt therefore confine ourſelves to this view of it; and ſhall carefully ſtate to our readers every improvement founded on principle, and on pneumatical laws.

114
by attempting to perfect the conſtruction of the cocks.

All who uſed it perceived the limit ſet to the rarefaction by the reſiſtance of the valves, and tried to perfect the conſtruction of the cocks. The abbé Nollet and Graveſande, two of the moſt eminent experimental philoſophers in Europe, were the moſt ſucceſsful.

115
Graveſande's improvement,

Mr Graveſande juſtly preferred Hooke's plan of a double pump, and contrived an apparatus for turning the cocks by the motion of the pump's handle. This is far from either being ſimple or eaſy in working; and occaſions great jerks and concuſſions in the whole machine. This, however, is not neceſſarily connected with the truly pneumatical improvement. His piſton has no valve, and the rod is connected with it by a ſtirrup D (fig. 22.), as in a common pum[illegible] rod has a cylindric part *cp*, which paſſes thr[illegible] [illegible]rup, and has a ſtiff motion in it up and [illegible]ut half an inch; being ſtopped by the ſh[illegible]e and the nut below. The round plate ſupported by this ſtirrup has a ſhort ſquare tube *nd*, which [illegible] into the

Fig. 22.

the hole of a piece of cork F. The round plate E has a ſquare ſhank *g*, which goes into the ſquare tube *n d*. A piece of thin leather *f*, ſoaked in oil, is put between the cork and the plate E, and another between the cork and the plate which forms the foot of the ſtirrup. All theſe pieces are ſcrewed together by the nut *h*, whoſe flat head covers the hole *n*. Suppoſe, therefore, the piſton touching the bottom of the barrel, and the winch turning to raiſe it again, the friction of the piſton on the barrel keeps it in its place, and the rod is drawn up through the ſtirrup D. Thus the wheel has liberty to turn about an inch; and this is ſufficient for turning the cock, ſo as to cut off the communication with the external air, and to open the communication with the receiver. This being done, and the motion of the winch continued, the piſton is raiſed to the top of the barrel. When the winch is turned in the oppoſite direction, the piſton remains fixed till the cock is turned, ſo as to ſhut the communication with the receiver, and open that with the external air.

116 and manner of uſing it,

117 a uſeful contrivance.

This is a pretty contrivance, and does not at firſt appear neceſſary; becauſe the cocks might be made to turn at the beginning and end of the ſtroke without it. But this is juſt poſſible; and the ſmalleſt error of adjuſtment, or wearing of the apparatus, will cauſe them to be open at improper times. Beſides, the cocks are not turned in an inſtant, and are improperly open during ſome very ſmall time; but this contrivance completely obviates this difficulty.

118 The cock is preciſely ſimilar to that formerly deſcribed, having one perforation diametrically through it, and another entering at right angles to this, and after reaching the centre, it paſſes along the axis of the cock, and comes out to the open air.

119 Its inconveniences,

It is evident, that by this conſtruction of the cock, the ingenious improvement of Dr Hooke, by which the preſſure of the atmoſphere on one piſton is made to balance (in great part) the preſſure on the other, is given up: for, whenever the communication with the air is opened, it ruſhes in, and immediately balances the preſſure on the upper ſide of the piſton in this barrel; ſo that the whole preſſure in the other muſt be overcome by the perſon working the pump. Graveſande, aware of this, put a valve on the orifice of the cock; that is, tied a ſlip of wet bladder or oiled leather acroſs it; and now the piſton is preſſed down, as long as the air in the barrel is rarer than the outward air, in the ſame manner as when the valve is in the piſton itſelf.

120 remedied.

121 Highly extolled, but

This is all that is neceſſary to be deſcribed in Mr Graveſande's air-pump. Its performance is highly extolled by him, as far exceeding his former pumps with valves. The ſame preference was given to it by his ſucceſſor Muſchenbroek. But, while they both prepared the piſtons and valves and leathers of the pump, by ſteeping them in oil, and then in a mixture of water and ſpirits of wine, we are certain that no juſt eſtimate could be made of its performance. For with this preparation it could not bring the gage within one-fifth of an inch of the barometer. We even ſee other limits to its rarefaction: from its conſtruction, it is plain that a very conſiderable ſpace is left between the piſton and cock, not leſs than an inch, from which the air is never expelled; and if this be made extremely ſmall, it is plain that the pump muſt be worked very ſlow, otherwiſe there will not be time for the air to diffuſe itſelf from the receiver into the barrel, eſpecially towards the end, when the exceeding ſlow, viz. the elaſticity of the remaining air, is very ſmall. There is alſo the ſame objection to this conſtruction, as in Hooke's or Hauksbee's pump, occaſioned by the valve L, which will not open till the air below the piſton is conſiderably denſer than the external air; and this pump loſes the advantage it poſſeſſed when uſed in the [illegible] barrel, by the cock's growing looſe and admitting air. It is ſurpriſing that Graveſande omitted Hauksbee's ſecurity againſt this, by placing the barrels in a diſh filled with oil; which would effectually have prevented this inconvenience.

122 limited in its operations.

123 [illegible]

124 [illegible]

We muſt not omit mentioning a conſiderable advantage of Graveſande, that in a pump conſtructed with cocks, and worked with a determined uniform velocity, the required degree of rarefaction is ſooner produced by ſhort barrels than by long ones. It would require too much time to give a general demonſtration of this, but it will eaſily be ſeen by an example. Suppoſe the long barrel to have equal capacity with the receiver, then at the end of the firſt ſtroke the air in the receiver will have one-half its natural denſity. Now, let the ſhort barrels have half this capacity: at the end of the firſt ſtroke the denſity of the air in the receiver is two-thirds, and at the end of the ſecond ſtroke it is four-ninths, which is leſs than one-half, and the two ſtrokes of the ſhort barrel are ſuppoſed to be made in the ſame time with one of longeſt, &c.

125 [illegible]

Hauksbee's pump maintained its preeminence without rival in Britain, and generally over the continent, except in France, where every thing took the caſt of the Academy, which abhorred being indebted to foreigners for any thing in ſcience, till about the year 1750, when it engaged the attention of Mr John Smeaton, a perſon of uncommon knowledge, and ſecond to none but Dr Hooke in ingenuity and mechanical reſource. He was then a maker of philoſophical inſtruments, and made many attempts to perfect the pumps with cocks, but found, that whatever perfection he could bring them to, he could not enable them to preſerve it; and he never would ſell one of this conſtruction. He therefore attached himſelf ſolely to the valve pumps.

126 by enlarging the valve-hole,

The firſt thing was to diminiſh the reſiſtance to the entry of the air from the receiver into the barrels: this he rendered almoſt nothing, by enlarging the ſurface on which this feebly elaſtic air was to preſs. Inſtead of making theſe valves to open by its preſſure on a circle of one-twentieth of an inch in diameter, he made the valve-hole one inch in diameter, enlarging the ſurface 400 times; and, to prevent this piece of thin leather from being burſt by the great preſſure on it, when the piſton in its deſcent was approaching the bottom of the barrel, he ſupported it by a delicate but ſtrong grating, dividing the valve-hole like the ſection of a honey-comb, as repreſented in fig. 25.; and the ribs of this grating are ſeen edgewiſe in fig. 23. at *a b c*.

Fig. 25. Fig. 23.

127 [illegible]

The valve was a piece of thin membrane or oiled ſilk, gently ſtrained over the mouth of the valve-hole, and tied on by a fine ſilk thread wound round it in the ſame manner that the narrow ſlips had been tied on, as formerly. This done, he cut with a pointed knife the leather round the edge, nearly four [illegible], leaving a ſmall tongue between each, as in fig. 25. The ſtrained valve immediately ſhrunk inwards, as repreſent-

Fig. 25.

ed by the ſhaded parts; and the ſtrain by which it is kept down is now greatly diminiſhed, taking place only at the corners. The gratings being reduced nearly to an edge (but not quite, leſt they ſhould cut), there is very little tendency to produce adheſion by the clammy oil. Thus it appears, that a very ſmall elaſticity of the air in the receiver will be ſufficient to raiſe the valve; and Mr Smeaton found, that when it was not able to do this at firſt, when only about [illegible] of the natural elaſticity, it would do it after keeping the piſton up eight or ten ſeconds, the air having been all the while undermining the valve, and gradually detaching it from the grating.

128 Increaſing the expelling force. Unfortunately he could not follow this method with the piſton valve. There was not room round the rod for ſuch a broad valve; and it would have obliged him to have a great ſpace below the valve, from which he could not expel the air by the deſcent of the piſton. He ingeniouſly fell on a way of increaſing the expelling force through the common valve: he incloſed the rod of the piſton in a collar of leather *l*, through which it moved freely without allowing any air to get paſt its ſides. For greater ſecurity, the collar of leather was contained in a box terminating in a cup filled with oil. As this makes a material change in the principle of conſtruction of the air-pump (and indeed of pneumatic engines in general), and as it has been adopted in all the ſubſequent attempts to improve them, it merits a particular conſideration.

129 Structure of the piſton for this purpoſe. Fig. 23. The piſton itſelf conſiſts of two pieces of braſs faſtened by ſcrews from below. The uppermoſt, which is of one ſolid piece with the rod GH (fig. 23.) is of a diameter ſomewhat leſs than the barrel; ſo that when they are ſcrewed together, a piece of leather ſoaked in a mixture of boiled oil and tallow, is put between them; and when the piſton is thruſt into the barrel from above, the leather comes up around the ſide of the piſton, and fills the barrel, making the piſton perfectly air-tight. The lower half of the piſton projects upwards into the upper, which has a hollow *g b c d* to receive it. There is a ſmall hole through the lower half at *a* to admit the air; and a hole *c d* in the upper half to let it through, and there is a ſlip of oiled ſilk ſtrained acroſs the hole *a* by way of valve, and there is room enough left at *b c* for this valve to riſe a little when preſſed from below. The rod GH paſſes through the piece of braſs which forms the top of the barrel ſo as to move freely, but without any ſenſible ſhake: this top is formed into a hollow box, conſiſting of two pieces ECDF and CNOD, which ſcrew together at CD. This box is filled with rings of oiled leather exactly fitted to its diameter, each having a hole in it for the rod to paſs through. When the piece ECDF is ſcrewed down, it compreſſes the leathers; ſqueezing them to the rod, ſo that no air can paſs between them; and, to ſecure us againſt all ingreſs of air, the upper part is formed into a cup EF, which is kept filled with oil.

The top of the barrel is alſo pierced with a hole LK, which riſes above the flat ſurface NO, and has a ſlip of oiled ſilk tied over it to act as a valve; opening when preſſed from below, but ſhutting when preſſed from above.

The communication between the barrel and receiver is made by means of the pipe ABPQ; and there goes from the hole K in the top of the barrel a pipe KRST, which either communicates with the open air or with the receiver, by means of the cock at its extremity T. The conduit pipe ABPQ has alſo a cock at Q, by which it is made to communicate either with the receiver or with the open air. Theſe channels of communication are variouſly conducted and terminated, according to the views of the maker: the ſketch in this figure is ſufficient for explaining the principle, and is ſuited to the general form of the pump, as it has been frequently made by Nairne and other artiſts in London.

130 Superiority of this conſtruction, Let us now ſuppoſe the piſton at the top of the barrel, and that it applies to it all over, and that the air in the barrel is very much rarefied: in the common pump the piſton valve is preſſed hard down by the atmoſphere, and continues ſhut till the piſton gets far down, condenſes the air below it beyond its natural ſtate, and enables it to force up the valves. But here, as ſoon as the piſton quits the top of the barrel, it leaves a void behind it; for no air gets in round the piſton rod, and the valve at K is ſhut by the preſſure of the atmoſphere. There is nothing now to oppoſe the elaſticity of the air below but the ſtiffneſs of the valve *b c*; and thus the expelling (or more accurately the liberating) force is prodigiouſly increaſed.

131 ſhown by example. The ſuperiority of this conſtruction will be beſt ſeen by an example. Suppoſe the ſtiffneſs of the valve equal to the weight of $\frac{1}{10}$ of an inch of mercury, when the barometer ſtands at 30 inches, and that the pump-gage ſtands at 29.9; then, in an ordinary pump, the valve in the piſton will not riſe till the piſton has got within the 300th part of the bottom of the barrel, and it will leave the valve-hole filled with air of the ordinary denſity. But in this pump the valve will riſe as ſoon as the piſton quits the top of the barrel; and when it is quite down, the valve-hole *a* will contain only the 300th part of the air which it would have contained in a pump of the ordinary form. Suppoſe farther, that the barrel is of equal capacity with the receiver, and that both pumps are ſo exactly conſtructed, that the ſpace left below the piſton is the 300th part of the barrel. In the common pump the piſton valve will riſe no more, and the rarefaction can be carried no farther, however delicate the barrel valve may be; but in this pump the next ſtroke will raiſe the gage to 29.95, and the piſton valve will again riſe as ſoon as the piſton gets half way down the barrel.

The limit to the rarefaction by this pump depends chiefly on the ſpace contained in the hole LK, and in the ſpace *b c d* of the piſton. When the piſton is brought up to the top, and applied cloſe to it, thoſe ſpaces remain filled with air of the ordinary denſity, which will expand as the piſton deſcends, and thus will retard the opening of the piſton valve. The rarefaction will ſtop when the elaſticity of this ſmall quantity of air, expanded ſo as to fill the whole barrel (by the deſcent of the piſton to the bottom), is juſt equal to the force requiſite for opening the piſton valve.

132 Its eaſily worked. Another advantage attending this conſtruction is, that in drawing up the piſton, we are not reſiſted by the whole preſſure of the air; becauſe the air is rarefied above this piſton as well as below it, and the piſton is in preciſely the ſame ſtate of preſſure as if connected with another piſton in a double pump. The reſiſtance to the aſcent of the piſton is the exceſs of the elaſticity of the air above it over the elaſticity of the air below: this,

Air-pump.

this, toward the end of the rarefaction, is very small, while the piston is near the bottom of the barrel, but [illegible] increases as the piston rises, and reduces the [illegible] into smaller dimensions, and becomes equal to the preſſure of the atmosphere, when the air above the piston is [illegible]. [illegible] the piston still farther, [illegible] it; [illegible] a small hole in the top of the barrel, [illegible] valve. [illegible] as soon as the piston begins to descend, leaving [illegible].

This pump has another advantage. It may be changed in a moment from a rarefying to a condensing engine, by [illegible] the [illegible] Q and T. While T communicates with the open air and Q with the receiver, it is a rarefying engine [illegible]; but when T communicates with the receiver, and Q with the open air, it is a condensing engine.

Fig. 25. represents Mr Smeaton's air-pump as it is [illegible] by Nairne. Upon a solid base or table are [illegible] pillars F, H, H; the pillar F supports the pump-plate A; and the pillars H, H, ſupport the front or head, containing a braſs cog-wheel, which is turned by the handle B, and works in the rack C [illegible] to the upper end of the piston rod. The whole is still farther [illegible] by two pieces of braſs [illegible] *b*, which connect the pump-plate with the floor, and [illegible] communicating between the hole *a* in the middle of the plate and the barrel, as will be deſcribed immediately. DE is the barrel of the pump, firmly fixed to the table by ſcrews thro' its upper flanch: *e f d c* is a ſlender braſs tube ſcrewed to the bottom of the barrel, and to the under [illegible] of the horizontal canal *c b*. In this canal there is a cock [illegible] which opens a communication between the barrel and the receiver, when the key is in the poſition represented here: but when the key is at right angles with this poſition, this communication is cut off. If that ſide of the key which is here drawn next to the pump-plate be turned outward, the external air is admitted into the receiver; but if turned inwards, the air is admitted into the barrel.

g h I is another ſlender braſs pipe, leading from the diſcharging valve at *g* to the horizontal canal *k i*, to the under ſide of which it is ſcrewed faſt. In this horizontal canal there is a cock *n* which opens a paſſage from the barrel to the receiver when the key is in the poſition here drawn; but opens a paſſage from the barrel to the external air when the key is turned outwards, and from the receiver to the external air when the key is turned inwards. This communication with the external air is not immediate but through a ſort of box *i*; the uſe of this box is to receive the oil which is diſcharged through the top valve *g*. In order to keep the pump tight, and in working order, it is proper ſometimes to pour a table ſpoonful of olive oil into the hole *a* of the pump-plate, and then to work the pump. The oil goes along the conduit *b c d f e*, gets into the barrel and through the piſton-valve, when the piſton is preſſed to the bottom of the barrel, and is then drawn up, and forced through the diſcharging valve *g* along the pipe *g h*, the horizontal paſſage *h n*, and finally into the box *i*. The box has a ſmall hole in its ſide near the top, through which the air eſcapes.

From the upper ſide of the conduit [illegible] ſlender pipe [illegible]

[illegible]

[illegible] the piston [illegible] pipe, condenſing the air before it in the ſame degree that it is [illegible] in the barrel and receiver.

In constructing this pump, Mr Smeaton [illegible] a method of joining together the [illegible] pieces, which has great advantages over the usual manner of ſcrewing them together [illegible] which is now much used in [illegible] engines. We ſhall explain this to our readers by a deſcription of the manner in which the exhauſting gage is joined to the horizontal duct *c b*.

The piece *h i p*, in fig. 23. is the ſame with the little piece [illegible] on the upper ſide of the horizontal canal *c d*, in fig. 26. The upper part *h i* is formed into an outſide ſcrew, to fit the hollow ſcrew of the piece *d e e d*. The top of this last piece has a hole in its middle, giving an eaſy paſſage to the bent tube *c b a*, ſo as to ſlip along it with freedom. To the end *c* of this bent tube is ſoldered a piece of braſs *c f g*, perforated in continuation of the tube, and having its end ground flat on the top of the piece *h i p*, and alſo covered with a ſlip of thin leather ſtrained acroſs it and pierced with a hole in the middle.

It is plain from this form, that if the ſurface *f g* be applied to the top of *h i*, and the cover *d e e d* be ſcrewed down on it, it will draw or preſs them together, ſo that no air can eſcape by the joint, and this without turning the whole tube *c b a* round, as is neceſſary in the uſual way. This method is now adopted for joining together the conducting pipes of the machines for extinguiſhing fires, an operation which was extremely troubleſome before this improvement.

The conduit pipe E *e f c* (fig. 26.) is faſtened to the bottom of the barrel, and the diſcharging pipe *g h* to its top, in the ſame manner. But to return to the gage; the bent pipe *c b a* enters the box *s t* near one ſide, and obliquely, and the gage pipe *q r* is inſerted through its bottom towards the oppoſite ſide. The uſe of this box is to catch any [illegible] of mercury which may [illegible] be daſhed up through the gage pipe by an accidental [illegible]. This, by going through the [illegible] of the pump, would corrode them, and would act particularly on the joints, which are generally ſoldered with tin. When this happens to an air-pump, it muſt be cleaned with the moſt ſcrupulous attention, otherwiſe it will be quickly deſtroyed.

Fig. 26

This account of Smeaton's pump is ſufficient for enabling the reader to underſtand its operation and to ſee its ſuperiority. It is reckoned a very fine pump of the ordinary conſtruction which will rarefy 200 times, or [illegible] that to rarefying 600 times. When in fine order, he found no bounds to its rarefaction, frequently raiſing the gage as high as the barometer; and he thought its performance ſo perfect, that the barometer gage was not ſufficiently delicate for meaſuring the rarefaction. He therefore ſubſtituted the ſyphon gage already deſcribed, which he gives ſome reaſons for preferring; but even this he found not ſufficiently ſenſible.

136
Another contrivance of Smeaton's
Fig. 27.

He contrived another, which could be carried to any degree of ſenſibility. It conſiſted of a glaſs body A (fig. 27.), of a pear ſhape, and was therefore called the pear-gage. This had a ſmall projecting orifice at B, and at the other end a tube CD, whoſe capacity was the hundredth part of the capacity of the whole veſſel. This was ſuſpended at the ſlip-wire of the receiver, and there was ſet below it a ſmall cup with mercury. When the pump was worked, the air in the pear-gage was rarefied along with the reſt. When the rarefaction was brought to the degree intended, the gage was let down till B reached the bottom of the mercury. The external air being now let in, the mercury was raiſed into the pear, and ſtood at ſome height E in the tube CD. The length of this tube being divided into 100 parts, and thoſe numbered from D, it is evident that $\frac{DE}{DB}$ will expreſs the degree of rarefaction which had been produced when the gage was immerſed into the mercury: or if DC be $\frac{1}{100}$ of the whole capacity, and be divided into 100 parts by a ſcale annexed to it, each unit of the ſcale will be $\frac{1}{10000}$ of the whole.

137
very ingenious.

This was a very ingenious contrivance, and has been the means of making ſome very curious and important diſcoveries which at preſent engage the attention of philoſophers. By this gage Mr Smeaton found, that his pump frequently rarefied a thouſand, ten thouſand, nay an hundred thouſand times. But though he in every inſtance ſaw the great ſuperiority of his pump above all others, he frequently found irregularities which he could not explain, and a want of correſpondence between the pear and the barometer gages which puzzled him. The pear-gage frequently indicated a prodigious rarefaction, when the barometer-gage would not ſhow more than 600.

138
It excited the attention of the literary world.

Theſe unaccountable phenomena excited the curioſity of philoſophers, who by this time were making continual uſe of the air-pump in their meteorological reſearches, and much intereſted in every thing connected with the ſtate or conſtitution of elaſtic fluids. Mr Nairne, a moſt ingenious and accurate maker of philoſophical inſtruments, made many curious experiments in the examination and compariſon of Mr Smeaton's pump with thoſe of the uſual conſtruction, attending to every circumſtance which could contribute to the inferiority of the common pumps or to their improvement, ſo as to bring them nearer to this rival machine. This rigorous compariſon brought into view ſeveral circumſtances in the conſtitution of the atmoſpheric air, and its relation to other bodies, which are of the moſt extenſive and important influence in the operations of nature. We ſhall notice at preſent ſuch only as have a relation to the operation of the air-pump in extracting AIR from the receiver.

139
Experiments with it by Mr Nairne

Mr Nairne found, that when a little water, or even bit of paper damped with water, was expoſed under the receiver of Mr Smeaton's air-pump, when in the moſt perfect condition, raiſing the mercury in the barometer-gage to 29.95, he could not make it riſe above 29.8 if Fahrenheit's thermometer indicated the temperature 47°, nor above 29.7 if the thermometer ſtood at 55°; and that to bring the gage to this height and keep it there, the operation of the pump muſt be continued for a long time after the water had diſappeared or the paper become perfectly dry. He found that a drop of ſpirits, or paper moiſtened with ſpirits, could not in thoſe circumſtances allow the mercury in the gage to riſe to near that height; and that ſimilar effects followed from admitting any volatile body whatever into the receiver or any part of the apparatus.

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ſhow the impropriety of ſoaking the leather with water,

This ſhowed him at once how improper the directions were which had been given by Guericke, Boyle, Graveſande, and others, for fitting up the air-pump for experiment, by ſoaking the leather in water, covering the joints with water, or in ſhort, admitting water or any other volatile body near it.

141
and the utility of uſing olive oil and tallow.

He therefore took his pumps to pieces, cleared them of all the moiſture which he could drive from them by heat, and then leathered them anew with leather ſoaked in a mixture of olive oil and tallow, from which he had expelled all the water it uſually contains, by boiling it till the firſt frothing was over. When the pumps were fitted up in this manner, he uniformly found that Mr Smeaton's pump rarefied the gage to 29.95, and the beſt common pump to 29.87, the firſt of which he computed to indicate a rarefaction to 600, and the other to 230. But in this ſtate he again found that a piece of damp paper, leather, wood, &c. in the receiver, reduced the performance in the ſame manner as before.

142
A remarkable phenomenon

But the moſt remarkable phenomenon was, that when he made uſe of the pear-gage with the pump cleared from all moiſture, it indicated the ſame degree of rarefaction with the barometer-gage: but when he expoſed a bit of paper moiſtened with ſpirits, and thus reduced the rarefaction of the pump to what he called 50, the barometer gage ſtanding at 29.4, the pear-gage indicated a rarefaction exceeding 100,000; in ſhort, it was not meaſurable; and this phenomenon was almoſt conſtant. Whenever he expoſed any ſubſtance ſuſceptible of evaporation, he found the rarefaction indicated by the barometer-gage greatly reduced, while that indicated by the pear-gage was prodigiouſly increaſed; and both theſe effects were more remarkable as the ſubject was of eaſier evaporation, or the temperament of the air of the chamber was warmer.

143
accounted for.

This uniform reſult ſuggeſted the true cauſe. Water boils at the temperature 212, that is, it is then converted into a vapour which is permanently elaſtic while of that temperature, and its elaſticity balances the preſſure of the atmoſphere. If this preſſure be diminiſhed by rarefying the air above it, a low temperature will not allow it to be converted into elaſtic vapour, and keep it in that ſtate. Water will boil in the receiver of an air-pump at the temperature 96, or even under it. Philoſophers did not think of examining the ſtate of the vapour in temperatures lower than what produced ebullition. But it now appears, that in much lower heats than this the ſuperficial water is converted into elaſtic vapour, which continues to exhale from it as long as the water laſts, and, ſupplying the place of air in the receiver, exerts the ſame elaſticity, and hinders the mercury from riſing in the gage in the ſame manner as ſo much air of equal elaſticity would have done.

144 Experiment illuſtrating this account.

When Mr Nairne was exhibiting theſe experiments to the Honourable Henry Cavendiſh in 1776, this gentleman informed him that it appeared from a ſeries of experiments of his father Lord Charles Cavendiſh, that when water is of the temperature 72°, it is converted into vapour, under any preſſure leſs than three-fourths of an inch of mercury, and at 41° it becomes vapour when the preſſure is leſs than one-fourth of an inch: Even mercury evaporates in this manner when all preſſure is removed. A dewy appearance is frequently obſerved covering the inſide of the tube of a barometer, where we uſually ſuppoſe a vacuum. This dew, when viewed through a microſcope, appears to be a ſet of detached globules of mercury, and upon inclining the tube ſo that the mercury may aſcend along it, theſe globules will be all licked up, and the tube become clear. The dew which lined it was the vapour of the mercury condenſed by the ſide of the tube; and it is never obſerved but when one ſide is expoſed to a ſtream of cold air from a window, &c.

To return to the vapour in the air pump receiver, it muſt be obſerved, that as long as the water continues to yield it, we may continue to work the pump; and it will be continually abſtracted by the barrels, and diſcharged in the form of water, becauſe it collapſes as ſoon as expoſed to the external preſſure. All this while the gage will not indicate any more rarefaction, becauſe the thing immediately indicated by the barometer-gage is *diminiſhed elaſticity*, which does not happen here. When all the water which the temperature of the room can keep elaſtic has evaporated under a certain preſſure, ſuppoſe ½ an inch of mercury, the gage ſtanding at 29.5, the vapour which now fills the receiver expands, and by its diminiſhed elaſticity the gage riſes, and now ſome more water which had been attached to bodies by chemical or corpuſcular attraction is detached, and a new ſupply continues to ſupport the gage at a greater height; and this goes on continually till *almoſt* all has been abſtracted: but there will remain ſome which no art can take away; for as it paſſes through the barrels, and gets between the piſton and the top, it ſucceſſively collapſes into water during the aſcent of the piſton, and again expands into vapour when we puſh the piſton down again. Whenever this happens there is an end of the rarefaction.

145 Air and vapour not uniformly mixed together.

While this operation is going on, the air comes out along with the vapour; but we cannot ſay in what proportion. If it were always uniformly mixed with the vapour, it would diminiſh rapidly; but this does not appear to be the caſe. There is a certain period of rarefaction in which a tranſient cloudineſs is perceived in the receiver. This is watery vapour formed at that degree of rarefaction, mingled with, but not diſſolved in or united with, the air, otherwiſe it would be tranſparent. A ſimilar cloud will appear if damp air be admitted ſuddenly into an exhauſted receiver. The vapour, which formed an uniform tranſparent maſs with the air, is either ſuddenly expanded and thus detached from the other ingredient, or is ſuddenly let go by the air, which expands more than it does. We cannot affirm with probability which of theſe is the caſe. Different compoſitions of air, that is, air loaded with vapours from different ſubſtances, exhibit remarkable differences in this reſpect. But we ſee from this and other phenomena, which ſhall be mentioned in their proper places, that the air and vapour are not always intimately united; and therefore will not always be drawn out together by the air-pump. But let them be ever ſo intimately blended, we ſee that the air muſt come out along with the vapour, and its quantity remaining in the receiver muſt be prodigiouſly diminiſhed by this effluxion, probably much more than could be, had the receiver only contained pure air.

146 [illegible] rarefaction different in the pear and barometer gages.

Let us now conſider what muſt happen in the pear-gage. As the air and vapour are continually drawn off from the receiver, the air in the pear expands and goes off with it. We ſhall ſuppoſe that the generated vapour hinders the gage from riſing beyond 29.5. During the continued working of the pump, the air in the pear, whoſe elaſticity is 0.5, ſlowly mixes with the vapour at the mouth of the pear, and the mixture even advances into its inſide, ſo that if the pumping be long enough continued, what is in the pear is nearly of the ſame compoſition with what is in the receiver, conſiſting perhaps of 20 parts of vapour and one part of air, all of the elaſticity of 0.5. When the pear is plunged into the mercury, and the external air allowed to get into the receiver, the mercury riſes in the pear gage, and leaves not $\frac{1}{60}$, but $\frac{1}{60 \times 20}$ or $\frac{1}{1200}$ of it filled with common air, the vapour having collapſed into an inviſible atom of water. Thus the pear gage will indicate a rarefaction of 1200, while the barometer-gage only ſhowed 60, that is, ſhowed the elaſticity of the included ſubſtance diminiſhed 60 times. The concluſion to be drawn from theſe two meaſures (the one of the rarefaction of air, and the other of the diminution of elaſticity) is, that the matter with which the receiver was filled, immediately before the readmiſſion of the air, conſiſted of one part of incondenſible air, and $\frac{1200}{60}$, or 20 parts of watery vapour.

147 [illegible] in accounting for [illegible]

The only obſcure part of this account is what relates to the compoſition of the matter which filled the pear-gage before the admiſſion of the mercury. It is not eaſy to ſee how the vapour of the receiver comes in by a narrow mouth while the air is coming out by the ſame paſſage. Accordingly it requires a very long time to produce this extreme rarefaction in the pear-gage; and there are great irregularities in any two ſucceeding experiments, as may be ſeen by looking at Mr Nairne's account of them in the Philoſophical Tranſactions, vol. lxvii. Some vapours appear to have mixed much more readily with the air than others; and there are ſome unaccountable caſes where vitriolic acid and ſulphureous bodies were included, in which the diminution of denſity indicated by the pear gage was uniformly leſs than the diminution of elaſticity indicated by the barometer gage. It is enough for us at preſent to have eſtabliſhed, by unqueſtionable facts, this production of elaſtic vapour, and the neceſſity of attending to it, both in the conſtruction of the air-pump and in drawing reſults from experiments exhibited in it.

148 [illegible]

Mr Smeaton's pump, when in good order, and perfectly free from all moiſture, will in dry weather rarefy the air about 600 times, raiſing the barometer gage to [illegible]

Air-pump. in [illegible] of an inch of a fine barometer. This was a performance ſo much ſuperior to that of all others, and by means of Mr Nairne's experiments opened ſo new a field of obſervation, that the air-pump once more became a capital inſtrument among the experimental philoſophers. The cauſes of its ſuperiority were alſo ſo diſtinct, that artiſts were immediately excited to a farther improvement of the machine; ſo that this becomes a new epoch in its hiſtory.

149 Improvements in this pump attempted. There is one imperfection which Mr Smeaton has not attempted to remove. The diſcharging valve is ſtill opened againſt the preſſure of the atmoſphere. An author of the Swediſh academy adds a ſubſidiary pump to this valve, which extracts the air from above it, and thus puts it in the ſituation of the piſton valve. We do not find that this improvement has been adopted ſo as to become general. Indeed the quantity of air which remains in the paſſage to this valve is ſo exceedingly little, that it does not ſeem to merit attention. Suppoſing the valve hole $\frac{1}{20}$ of an inch wide and as deep (and it need not be more), it will not occupy more than $\frac{1}{30000}$ part of a barrel twelve inches long and two inches wide.

150 Mr Smeaton, by his ingenious conſtruction, has greatly diminiſhed, but has not annihilated, the obſtructions to the paſſage of the air from the receiver into the barrel. His ſucceſs encouraged farther attempts. One of the firſt and moſt ingenious was that of Profeſſor Ruſſel of the univerſity of Edinburgh, who about the year 1770 conſtructed a pump in which both cocks and valves were avoided.

151 By Ruſſel, Fig. 28. The piſton is ſolid, as repreſented in fig. 28. and its rod paſſes through a collar of leather on the top of the barrel. This collar is divided into three portions by two braſs rings *a*, *b*, which leave a very ſmall ſpace round the piſton rod. The upper ring *a* communicates by means of a lateral perforation with the bent tube, *l m n*, which enters the barrel at its middle *n*. The lower ring *b* communicates with the bent tube *c d*, which communicates with the horizontal paſſage *d c*, going to the middle *e* of the pump plate. By the way, however, it communicates alſo with a barometer gage *p o*, ſtanding in a ciſtern of mercury *o*, and covered with a glaſs tube cloſe at the top. Beyond *e*, on the oppoſite circumference of the receiver plate, there is a cock or plug *f* communicating with the atmoſphere.

The piſton rod is cloſely embraced by the three collars of leather; but, as already ſaid, has a free ſpace round it in the two braſs rings. To produce this preſſure of the leathers to the rod, the braſs rings which ſeparate them are turned thinner on the inner ſide, ſo that their croſs ſection along a diameter would be a taper wedge. In the ſide of the piſton rod are two cavities *q r*, *t s*, about one-tenth of an inch wide and deep, and of a length equal to the thickneſs of the two rings *a*, *b*, and the intermediate collar of leathers. Theſe cavities are ſo placed on the piſton-rod, that when the piſton is applied to the bottom of the barrel, the cavity *t s* in the upper end of the rod has its upper end oppoſite to the ring *a*, and its lower end oppoſite to the ring *b*, or to the mouth of the pipe *c d*. Therefore, if there be a void in the barrel, the air from the receiver will come from the pipe *c d*, into the cavity in the piſton rod, and by it will get paſt the collar of leather between the rings, and thus will get into the ſmall interſtice between the rod and the upper ring, and then into the pipe *l m n*, and into the empty barrel. When the piſton is drawn up, the ſolid rod immediately ſhuts up this paſſage, and the piſton drives the air through the diſcharging valve *e*. When it has reached the top of the barrel, and is cloſely applied to it, the cavity *q r* is in the ſituation in which *t s* formerly was, and the communication is again opened between the receiver and the empty barrel, and the air is again diffuſed between them. Puſhing down the piſton expels the air by the lower diſcharging pipe and valve [illegible]; and thus the operation may be continued.

This muſt be acknowledged to be a moſt ſimple and ingenious conſtruction, and can neither be called a cock nor a valve. It ſeems to oppoſe no obſtruction whatever: and it has the ſuperior advantage of rareſying both during the aſcent and the deſcent of the piſton, doubling the expedition of the performance, and the operator is not oppoſed by the preſſure of the atmoſphere except towards the end of each ſtroke. The expedition, however, is not ſo great as one ſhould expect; for nothing is going on while the piſton is in motion, and the operator muſt ſtop a while at the end of each ſtroke, that the air may have time to come through this long, narrow, and crooked paſſage, to fill the barrel. But the chief difficulty which occurred in the execution aroſe from the clammy oil with which it was neceſſary to impregnate the collar of leathers. Theſe were always in a ſtate of ſtrong compreſſion, that they might cloſely graſp the piſton rod, and prevent all paſſage of air during the motion of the piſton. Whenever therefore the cavities in the piſton rod come into the ſituations neceſſary for connecting the receiver and barrel, this oil is ſqueezed into them, and choaks them up. Hence it always happened that it was ſome time after the ſtroke before the air could force its way round the piſton rod, carrying with it the clammy oil which choaked up the tube *l m n*; and when the rarefaction had proceeded a certain length, the diminiſhed elaſticity of the air was not able to make its way through theſe obſtructions. The death of the ingenious author put a ſtop to the improvements by which he hoped to remedy this defect, and we have not heard that any other perſon has ſince attempted it. We have inſerted it here, becauſe its principle of conſtruction is not only very ingenious, but entirely different from all others, and may furniſh very uſeful hints to thoſe who are much engaged in the conſtruction of pneumatic engines.

152 By Haas and Hurter. In the 73d volume of the Philoſophical Tranſactions, Mr Tiberius Cavallo has given the deſcription of an air-pump contrived and executed by Meſſrs Haas and Hurter, inſtrument-makers in London, where theſe artiſts have revived Guericke's method of opening the barrel-valve during the laſt ſtrokes of the pump by a force acting from without. We ſhall inſert ſo much of this deſcription as relates to this diſtinguiſhing circumſtance of its conſtruction.

Fig. 29. Fig. 29. repreſents a ſection of the bottom of the barrel, where AA is the barrel and BB the bottom, which has in its middle a hollow cylinder CCFF, projecting about half an inch into the barrel at CC, and extending a good way downwards to FF. The ſpace between this projection and the ſides of the barrel is filled up by a braſs ring DD, over the top of which is ſtrained a piece of oiled ſilk EE, which performs the office of a valve, covering the hole CC. But this hole is filled up by a

Air-pump. piece of braſs, or rather an aſſemblage of pieces ſcrewed together GGHHII. It conſiſts of three projecting fillets or ſhoulders GG, HH, II, which form two hollows between them, and which are filled with rings of oiled leather OO, PP, firmly ſcrewed together. The extreme fillets GG, II, are of equal diameter with the inſide of the cylinder, ſo as to fill it exactly, and the whole ſtuffed with oiled leather, ſlide up and down without allowing any air to paſs. The middle fillet HH is not ſo broad, but thicker. In the upper fillet GG there is formed a hollow diſh about ¼ of an inch deep and ¾ wide. This diſh is covered with a thin plate, pierced with a grating like Mr Smeaton's valve plate. There is a perforation VX along the axis of this piece, which has a paſſage out at one ſide H, through the middle fillet. Oppoſite to this paſſage, and in the ſide of the cylinder CCFF, is a hole M, communicating with the conduit pipe MN, which leads to the receiver. Into the lower end of the perforation is ſcrewed the pin KL, whoſe tail L paſſes through the cap FF. The tail L is connected with a lever RQ, moveable round the joint Q. This lever is puſhed upwards by a ſpring, and thus the whole piece which we have been deſcribing is kept in contact with the ſlip of oiled ſilk or valve EE. This is the uſual ſituation of things.

153 Now ſuppoſe a void formed in the barrel by drawing up the piſton; the elaſticity of the air in the receiver, in the pipe NM, and in the paſſage XV, will preſs on the great ſurface of the valve expoſed through the grating, will raiſe it, and the pump will perform preciſely as Mr Smeaton's does. But ſuppoſe the rarefaction to have been ſo long continued, that the air is no longer able to raiſe the valve; this will be ſeen by the mercury riſing no more in the pump-gage. When this is perceived, the operator muſt preſs with his foot on the end R of the lever RQ. This draws down the pin KL, and with it the whole hollow plug with its grated top. And thus, inſtead of raiſing the valve from its plate, the plate is here drawn down from the valve. The air now gets in without any obſtruction whatever, and the rarefaction proceeds as long as the piſton riſes. When it is at the top of the barrel, the operator takes his foot from the lever, and the ſpring preſſes up the plug again and ſhuts the valve. The piſton rod paſſes through a collar of leather, as in Mr Smeaton's pump, and the air is finally diſcharged through an outward valve in the top of the barrel. Theſe parts have nothing peculiar in them.

This is an ingenious contrivance, ſimilar to what was adapted by Guericke himſelf; and we have no doubt of theſe pumps performing extremely well if carefully made: and it ſeems not difficult to keep the plug perfectly air-tight by ſupplying plenty of oil to the leathers. We cannot ſay, however, with preciſion what may be expected from it, as no account has been given of its effects beſides what Mr Cavallo publiſhed in Philoſophical Tranſactions 1783, where he only ſays, that when it had been long uſed, it had, in the courſe of ſome experiments, rarefied 600 times.

154 by Prince, Aiming ſtill at the removing the obſtructions to the entry of the air from the receiver into the barrels, Mr Prince, an American, has conſtructed a pump in which there is no valve or cock whatever between them. In this pump the piſton rod paſſes through a collar of leathers, and the air is finally diſcharged through a valve, as in the two laſt. But we are chiefly to attend, in this place, to the communication between the barrel and the receiver. The barrel widens below into a ſort of ciſtern ABCD (fig. 32.), communicating with the receiver by the pipe EF. As ſoon, therefore, as the piſton gets into this wider part, where there is a vacancy all round it, the air of the receiver expands freely through the paſſage FEE into the barrel, in which the deſcent of the piſton had made a void. When the piſton is again drawn up, as ſoon as it gets into the cylindric part of the barrel, which it exactly fills, it carries up the air before it, and expels it by the top valve; and, that this may be done more completely, this valve opens into a ſecond barrel or air-pump whoſe piſton is riſing at the ſame time, and therefore the valve of communication (which is the diſcharging valve of the primary pump) opens with the ſame facility as Mr Smeaton's piſton valve. While the piſton is riſing, the air in the receiver expands into the barrel; and when the piſton deſcends, the air in the barrel again collapſes till the piſton gets again into the ciſtern, when the air paſſes out, and fills the evacuated barrel, to be expelled by the piſton as before.

No diſtinct account has as yet been given of the performance of this pump. We only learn that great inconveniences were experienced from the oſcillations of the mercury in the gage. As ſoon as the piſton comes into the ciſtern, the air from the receiver immediately ruſhes into the barrel, and the mercury ſhoots up in the gage, and gets into a ſtate of oſcillation. The ſubſequent riſe of the piſton will frequently keep time with the ſecond oſcillation, and increaſe it. The deſcent of the piſton produces a downward oſcillation, by allowing the air below it to collapſe; and, by improperly timing the ſtrokes, this oſcillation becomes ſo great as to make the mercury enter the pump. To prevent this, and a greater irregularity of working as a condenſer, valves were put in the piſton: but as theſe require force to open them, the addition ſeemed rather to increaſe the evil, by rendering the oſcillations more ſimultaneous with the ordinary rate of working. If this could be got over, the conſtruction ſeems very promiſing.

It appears, however, of very difficult execution. It has many long, ſlender, and crooked paſſages, which muſt be drilled through broad plates of braſs, ſome of them appearing ſcarcely practicable. It is rare to find plates and other pieces of braſs without air-holes, which it would be very difficult to find out and to cloſe; and it muſt be very difficult to clear it of obſtructions; ſo that it appears rather a ſuggeſtion of theory than a thing warranted by its actual performance.

155 [illegible]ier, Mr Lavoiſier, or ſome of the naturaliſts who were occupied in concert with him in the inveſtigation of the different ſpecies of gas which are diſengaged from bodies in the courſe of chemical operations, have contrived an air-pump which has great advantages in ſimplicity, and, being very different from all others, deſerves to be taken notice of.

It conſiſts of two barrels *h*, *m*, fig. 31. with ſolid piſtons *kk*. The pump-plate *a b* is pierced at its centre *c* with a hole which branches towards each of the barrels, as repreſented by *c d*, *c e*. Between the plate and the barrels there is a ſliding plate *h i*, pierced in the middle with a branched hole *f g*, and near the ends with ſmall holes *h i*, *i i*, which go from its under ſide to the ends. The holes in theſe two plates are ſo adjuſted, that when the plate *h i* is drawn ſo far towards *l* that the hole [illegible] within the barrel m, the branch df of the hole in the middle plate coincides with the branch cd of the upper plate, and the holes e, g are ſhut. Thus a communication is eſtabliſhed between the barrel l and the receiver on the pump-plate, and between the barrel m and the external air. In this ſituation the barrel l will exhauſt, and m will diſcharge. When the piſton of l is at its mouth, and that of m touches its bottom, the ſliding plate is ſhifted over to the other ſide, ſo that m communicates with the receiver through the paſſage gd, ec, and l communicates with the air by the paſſages $h\,h$.

It is evident that this ſliding plate performs the office of four cocks in a very beautiful and ſimple manner, and that if the piſtons apply cloſe to the ends of the barrels, ſo as to expel the whole air, the pump will be perfect. It works, indeed, againſt the whole preſſure of the external air. But this may be avoided by putting valves on the holes h, i; and theſe can do no harm, becauſe the air remaining in them never gets back into the barrel till the piſton be at the farther end, and the exhauſtion of that ſtroke completed. But the beſt workmen of London think that it will be incomparably more difficult to execute this cock (for it is a cock of an unuſual form), in ſuch a manner that it ſhall be air-tight and yet move with tolerable eaſe, and that it is much more liable to wearing looſe than common cocks. No accurate accounts have been received of its performance. It muſt be acknowledged to be ingenious, and it may ſuggeſt to an intelligent artiſt a method of combining common conical cocks upon one axis ſo as to anſwer the ſame purpoſes much more effectually; for which reaſon we have inſerted it here.

156 and by Cuthbertſon.

The laſt improvement which we ſhall mention is that publiſhed by Mr Cuthbertſon philoſophical inſtrument-maker in Amſterdam. His pump has given ſuch evidences of its perfection, that we can hardly expect or wiſh for any thing more complete. But we muſt be allowed to obſerve, beforehand, that the ſame conſtruction was invented, and, in part, executed before the end of 1779, by Dr Daniel Rutherford, now profeſſor of botany in the univerſity of Edinburgh, who was at that time engaged in experiments on the production of air during the combuſtion of bodies in contact with nitre, and who was vaſtly deſirous of procuring a more complete abſtraction of pure aerial matter than could be effected by Mr Smeaton's pump. The compiler of this article had then an opportunity of peruſing the Doctor's diſſertation on this ſubject, which was read in the Philoſophical Society of Edinburgh. In this diſſertation the Doctor appears fully appriſed of the exiſtence of pure vital air in the nitrous acid, as its chief ingredient, and as the cauſe of its moſt remarkable phenomena, and to want but a ſtep to the diſcoveries which have ennobled the name of Mr Lavoiſier. He was particularly anxious to obtain *apart* this diſtinguiſhing ingredient in its compoſition, and, for this purpoſe, to abſtract completely from the veſſel in which he ſubjected it to examination, every particle of elaſtic matter. The writer of this article propoſed to him to cover the bottom of Mr Smeaton's piſton with ſome clammy matter, which ſhould take hold of the bottom valve, and *ſtart it* when the piſton was drawn up. A few days after, the Doctor ſhowed him a drawing of a pump, having a conical metal valve in the bottom, furniſhed with a long ſlender wire, ſliding in the inſide of the piſton-rod with a gentle friction, ſufficient for lifting the valve, and ſecured againſt all chance of failure by a ſpring a-top, which took hold of a notch in the inſide of the piſton-rod about a quarter of an inch from the lower end, ſo as certainly to lift the valve during the laſt quarter of an inch of the piſton's motion. Being an excellent mechanic, he had executed a valve on this principle, and was fully ſatisfied with its performance. But having already confirmed his doctrines reſpecting the nitrous acid by incontrovertible experiments, his wiſhes to improve the air-pump loſt their incitement, and he thought no more of it; and not long after this, the ardour of the philoſophers of the Teylerian Society at Haerlem and Amſterdam excited the efforts of Mr Cuthbertſon, their inſtrument-maker, to the ſame purpoſe, and produced the moſt perfect air-pump that has yet appeared. We ſhall give a deſcription of it, and an account of its performance, in the inventor's own words.

Cuthbertson's Air-Pump.

157 Fig. 32.

On Plate CCCCXXVII. fig. 32. is a perſpective view of this pump, with its two principal gages ſcrewed into their places. Theſe need not be uſed together, except in caſes where the utmoſt exactneſs is required. In common experiments one of them is removed, and a ſtop-ſcrew put in its place. When the pear-gage is uſed, a ſmall round plate, on which the receiver may ſtand, muſt be firſt ſcrewed into the hole at A; but this hole is ſtopped on other occaſions with a ſcrew. When all the three gages are uſed, and the receiver is exhauſted, the ſtop-ſcrew B, at the bottom of the pump, muſt be unſcrewed, to admit the air into the receiver; but when they are not all uſed, either of the other ſtop-ſcrews will anſwer this purpoſe.

Fig. 33.

Fig. 33. repreſents a croſs-bar for preventing the barrels from being ſhaken by working the pump or by any accident. Its place in fig. 32. is repreſented by the dotted lines. It is confined in its place, and kept cloſe down on the barrels, by two ſlips of wood NN, which muſt be drawn out, as well as the ſcrews OO, when the pump is to be taken aſunder.

Plate CCCCXXVIII. exhibits a ſection of all the working parts of the pump, except the wheel and rack, in which there is nothing uncommon.

Fig. 34. is a ſection of one of the barrels, with all its internal parts; and fig. 35. 36. 37. and 38. are different parts of the piſton, proportioned to the ſize of the barrel (A) and to one another.

Fig. 34.

In fig. 34. CD repreſents the barrel, F the collar of leathers, G a hollow cylindrical veſſel to contain oil, R is alſo an oil-veſſel to receive the oil which is drawn, along with the air, through the hole $a\,a$, when the piſton is drawn upwards; and, when this is full, the oil is carried over with the air, along the tube T, into the oil-veſſel G. $c\,c$ is a wire which is driven upwards from the

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(A) The piſton and barrel are 1.65 inches in diameter, in proportion to which the ſcale is drawn. Figures 35. 36. 37. and 38. are, however, of double ſize.

Air-pump

the hole *a a* by the paſſage of the air; and as ſoon as this has eſcaped, it falls down again by its own weight, ſhuts up the hole, and prevents all return of the air into the barrel. At *d d* are fixed two pieces of braſs, to keep the wire *c c* in a vertical direction, that it may accurately ſhut the hole. H is a cylindrical wire or rod which carries the piſton I, and is made hollow to receive a long wire *g g*, which opens and ſhuts the hole L; and on the other end of the wire O is ſcrewed a nut, which, by ſtopping in the narroweſt part of the hole, prevents the wire from being driven up too far. This wire and ſcrew are more clearly ſeen in fig. 35. and 39.; they ſlide in a collar of leather *r r*, fig. 35. and 38. in the middle piece of the piſton. Fig. 37. and 38. are the two mean parts which compoſe the piſton, and, when the pieces 36. and 39. are added to it, the whole is repreſented by fig. 35. Fig. 38. is a piece of braſs of a conical form, with a ſhoulder at the bottom. A long hollow ſcrew is cut in it, about two-thirds of its length, and the remainder of the hole, in which there is no ſcrew, is of about the ſame diameter with the ſcrewed part, except a thin plate at the end, which is of a width exactly equal to the thickneſs of *g g*. That part of the inſide of the conical braſs in which no thread is cut, is filled with oiled leathers with holes through which *g g* can ſlide ſtiffly. There is alſo a male ſcrew with a hole in it, fitted to *g g*, ſerving to compreſs the leathers *r r*. In fig. 37. *a a a a* is the outſide of the piſton, the inſide of which is turned ſo as exactly to fit the outſide of fig. 38. *b b* are round leathers about 60 in number, *c c* is a circular piece of braſs of the ſize of the leathers, and *d d* is a ſcrew ſerving to compreſs them. The ſcrew at the end of fig. 36. is made to fit the ſcrew in fig. 38. Now if fig. 39. be puſhed into fig. 38. this into fig. 37. and fig. 36. be ſcrewed into the end of fig. 38. theſe will compoſe the whole of the piſton, as repreſented in fig. 34. H in fig. 34. repreſents the ſame part as H in fig. 35. and is that to which the rack is fixed. If, therefore, this be drawn upwards, it will cauſe fig. 38. to ſhut cloſe into fig. 37. and drive out the air above it; and when it is puſhed downward, it will open as far as the ſhoulder *a a* will permit, and ſuffer air to paſs through. AA, fig. 40. is the receiver plate, BB is a long ſquare piece of braſs, ſcrewed into the under ſide of the plate, through which a hole is drilled correſponding to that in the centre of the receiver-plates and with three female ſcrews *b*, *b*, *c*.

Fig. 40.

The rarefaction of the air in the receiver is effected as follows. Suppoſe the piſton at the bottom of the barrel. The inſide of the barrel, from the top of the piſton to *a*, fig. 34. contains common air. When the rod is drawn up, the upper part of the piſton ſticks faſt in the barrel till the conical part connected with the rod ſhuts the conical hole, and its ſhoulder applies cloſe to its bottom. The piſton is now ſhut, and therefore the *whole* is drawn up by the rack-work, driving the air before it through the hole *a c*, into the oil-veſſel at R, and out into the room by the tube T. The piſton will then be at the top of the barrel at *a*, and the wire *g g* will ſtand nearly as repreſented in the figure juſt raiſed from the hole L, and prevented from riſing higher by the nut O. During this motion the air will expand in the receiver, and come along the bent tube *m* into the barrel. Thus the barrel will be filled with air, which, as the piſton riſes, will be rarefied in proportion as the capacity of the receiver, pipes, and barrel, is to the barrel alone. When the piſton is moved down again by the rack-work, it will force the conical part fig. 38. out of the hollow part fig. 37. as far as the ſhoulders *a a*; fig. 35. will reſt on *a a* fig. 37. which will then be ſo far open as to permit the air to paſs freely through it, while at the ſame time the end of *g g* is forced againſt the top of the hole, and ſhuts it in order to prevent any air from returning into the receiver. Thus the piſton, moving downwards, ſuffers the air to paſs out between the ſides of fig. 37. and 38.; and, when it is at the bottom of the barrel, will have the column of air above it; and, conſequently, when drawn upwards it will ſhut, and drive out this air, and, by opening the hole L at the ſame time, will give a free paſſage to more air from the receiver. This proceſs being continued, the air of the receiver will be rarefied *as far as its expanſive power will permit*. For in this machine there are no valves to be forced open by the elaſticity of the air in the receiver, which at laſt it is unable to effect. There is therefore nothing to prevent the air from expanding to its utmoſt degree.

Fig. 34.

Air-pump

It may be ſuſpected here, that as the air muſt eſcape through the diſcharging paſſage *a c*, fig. 34. againſt the preſſure of a column of oil and the weight of the wire, there will remain in this paſſage a quantity of air of conſiderable denſity, which will expand again into the barrel during the deſcent of the piſton, and thus put a ſtop to the progreſs of rarefaction. This is the caſe in Mr Smeaton's pump, and all which have valves in the piſton. But it is the peculiar excellency of this pump, that whatever be the denſity of the air remaining in *a c*, the rarefaction will ſtill go on. It is worth while to be perfectly convinced of this. Let us ſuppoſe that the air contained in *a c* is $\frac{1}{100}$th part of the common air which would fill the barrel, and that the capacity of the barrel is equal to that of the receiver and paſſages, and that the air in the receiver and barrel is of the ſame denſity, the piſton being at the bottom of the barrel: The barrel will therefore contain $\frac{10}{1000}$ parts of its natural quantity, and the receiver $\frac{10}{1000}$. Now let the piſton be drawn up. No air will be diſcharged at *a c*, becauſe it will contain the whole air which was in the barrel, and which has now collapſed into its ordinary bulk. But this does not in the leaſt hinder the air of the receiver from expanding into the barrel, and diffuſing itſelf equally between both. Each will now contain $\frac{5}{1000}$ of their ordinary quantity when the piſton is at the top, and *a c* will contain $\frac{1}{100}$ as before, or $\frac{10}{1000}$. Now puſh down the piſton. The hole L is inſtantly ſhut, and the air in *a c* expands into the barrel, and the barrel now contains $\frac{15}{1000}$. When the piſton has reached the bottom, let it be again drawn up. There will be $\frac{5}{1000}$ diſcharged through *c*, and the air in the receiver will again be equally diſtributed between it and the barrel. Therefore the receiver will now contain $\frac{2\frac{1}{2}}{1000}$. When the piſton reaches the bottom, there will be $\frac{12\frac{1}{2}}{1000}$ in the barrel. When again drawn up to the top, there will be $\frac{2\frac{1}{2}}{1000}$ diſcharged, and the receiver will contain $\frac{1\frac{1}{4}}{1000}$; and when the piſton reaches the bottom, there will be $\frac{11\frac{1}{4}}{1000}$. At the next ſtroke the receiver will contain only $\frac{5\frac{5}{8}}{1000}$, &c. &c.

Thus it appears, that notwithſtanding the $\frac{1}{10}$, which always expands back again out of the hole *a c* into the barrel, the rarity of the air in the receiver will be doubled at every ſtroke. There is therefore no need of a ſubſidiary air-pump at *c*, as in the American air-pump, and in the Swediſh attempt to improve Smeaton's.

In uſing this air-pump no particular directions are neceſſary, nor is any peculiar care neceſſary for keeping it in order, except that the oil-veſſel A be always kept about half full of oil. When the pump has ſtood long without being uſed, it will be proper to draw a table-ſpoonful of olive-oil through it, by pouring it into the hole in the middle of the receiver-plate when the piſton is at the bottom of the barrel. Then by working the piſton, the oil will be drawn through all the parts of the pump, and the ſurplus will be driven through the tube T into the oil-veſſel G. Near the top of the piſton-rod at H there is a hole which lets ſome oil into the inſide of the rod, which gets at the collar of leathers *r r*, and keeps the [illegible] air-tight.

When the pump is uſed for condenſation at the ſame time that it rarefies, or ſeparately, the piece containing the bent tube T muſt be removed, and fig. 41. put into its place, and fixed by its ſcrews. Fig. 41. as drawn in the plate, is intended for a double barrelled pump. But for a ſingle barrel only one piece is uſed, repreſented by *b a a*, the double piece being cut off at the dotted line *a a*. In this piece is a female ſcrew to receive the end of a long braſs tube, to which a bladder (if ſufficient for the experiment of condenſation), or a glaſs, properly ſecured for this purpoſe, muſt be ſcrewed. Then the air which is abſtracted from the receiver on the pump-plate will be forced into the bladder or glaſs. But if the pump be double, the apparatus fig. 41. is uſed, and the long braſs tube ſcrewed on at *c*. Fig. 41.

Fig. 42. and 43. Fig. 42. and 43. repreſent the two gages, which will be ſufficiently explained afterwards. Fig. 42. is ſcrewed into *c b*, or into the ſcrew at the other end of *c* fig. 40. and fig. 43. into the ſcrew *a b* fig. 40.

If it be uſed as a ſingle pump, either to rarefy or condenſe, the ſcrew K, which faſtens the rack to the piſton-rod H, muſt be taken out. Then turning the winch till H is depreſſed as low as poſſible, the machine will be fitted to exhauſt as a ſingle pump; and if it be required to condenſe, the direction in N° 8. muſt be obſerved with regard to the tube T, and fig. 41.

"I took (ſays Mr Cuthbertſon) two barometer-tubes of an equal bore with that fixed to the pump. Theſe were filled with mercury four times boiled. They were then compared, and ſtood exactly at the ſame height. The mercury in one of them was boiled in it four times more, without making any change in their height; they were therefore judged very perfect. One of theſe was immerſed in the ciſtern of the pump-gage, and faſtened in a poſition parallel to it, and a ſliding ſcale of one inch was attached to it. This ſcale, when the gage is uſed, muſt have its upper edge ſet equal with the ſurface of the mercury in the boiled tube after exhauſtion, and the difference between the height of the mercury in this and in the other barometer tube may be obſerved to the $\frac{1}{100}$ of an inch; and being cloſe together, no error ariſes from their not being exactly vertical, if they are only parallel. This gage will be better underſtood by inſpecting fig. 43.

"I uſed a ſecond gage, which I ſhall call a double ſyphon. See fig. 42. This was alſo prepared with the utmoſt care. I had a ſcale for meaſuring the difference between the height of the columns in the two legs. It was an inch long, and divided as the former, and kept in a truly vertical poſition by ſuſpending it from a point with a weight hung to it, as repreſented in the figure. Upon comparing theſe two gages, I always found them to indicate the ſame degree of rarefaction. I alſo uſed a pear-gage, though the moſt imperfect of all, in order to repeat the curious experiments of Mr Nairne and others."

When experiments require the utmoſt rarefying power of the pump, the receiver muſt not be placed on leather, either oiled or ſoaked in water, as is uſually done. The pump-plate and the edge of the receiver muſt be ground very flat and true, and this with very fine emery, that no roughneſs may remain. The plate of the pump muſt then be wiped very clean and very dry, and the receiver rubbed with a warm cloth till it become electrical. The receiver being now ſet on the plate, hog's lard, either alone or mixed with a little oil, which has been cleared of water by boiling, muſt be ſmeared round its outſide edge. In this condition the pump will rarefy its utmoſt, and what ſtill remains in the receiver will be permanent air. Or a little of this compoſition may be thinly ſmeared on the pump-plate; this will prevent all riſk of ſcratching it with the edge of the receiver. Leather of very uniform thickneſs, long dried before a fire, and well ſoaked in this compoſition, which muſt be cleared of all water by the firſt boiling, will anſwer very well, and is expeditious, when receivers are to be frequently ſhifted. Other leathers ſhould be at hand ſoaked in a compoſition containing a little roſin. This gives it a clammineſs which renders it impermeable to air, and is very proper at all joints of the pump, and all apparatus for pneumatic experiments. As it is impoſſible to render the pear-gage as dry as other parts of the apparatus, there will be generally ſome variation between this and the other gages.

When it is only intended to ſhow the utmoſt power of the pump, without intending to aſcertain the quality of the reſiduum, the receiver may be ſet on wet leather. If, in this condition, the air be rarefied as far as poſſible, the ſyphon and barometer gage will indicate a leſs degree of rarefaction than in the former experiments. But when the air is let in again, the pear-gage will point out a rarefaction ſome thouſands of times greater than it did before. If the true quality of permanent air after exhauſtion be required, the pear-gage will be neareſt the truth: for when the air is rarefied to a certain degree, the moiſtened leather emits an expanſible fluid, which, filling the receiver, forces out the permanent air; and the two firſt gages indicate a degree of exhauſtion which relates to the whole elaſtic matter remaining in the receiver, viz. to the expanſible fluid together with the permanent air; whereas the pear-gage points out the degree of exhauſtion, with relation

Air-pump. [illegible] to the permanent air alone, which remains in the receiver; but by the pressure of the air admitted into the receiver, the elastic vapour is reduced to its former bulk, which is imperceptible.

Many bodies emit this elastic fluid when the pressure of the air is much diminished; a piece of leather, or an ordinary damp cloth, about an inch square, or a bit of green or dry wood, will supply this for a great while.

When such bodies have been exposed in any experiments, the pump must be carefully cleaned of them, for they remain not only in the receivers, but in the barrels and passages, and will again expand when the exhaustion has been carried far.

The best method of clearing the pump is to take a very large receiver, and, using every precaution to exhaust it as far as possible. Then the expansible matter lurking in the barrels and passes will be diffused through the receiver also, or will be carried off along with its air. It will be as much rarer than it was before, as the [illegible] capacity of the receiver barrels and passes is larger than that of [illegible].

The performance of the pump may be judged of from the four following experiments.

The two gages being screwed into their places, and the [illegible] the pump was made to exhaust as far as it could. The mercury in the leg of the syphon was only [illegible] of an inch out of the level, and that in the boiled barometer-gage [illegible] of an inch higher than in the one screwed to the pump. A standard barometer then stood at 30 inches, and therefore the pump rarefied the permanent air 1200 times. This is twice as much as Mr Nairne found Mr Smeaton's do in its best state. Mr Cavallo seems disposed to give a favourable (while we must suppose it a just) account of Haas and Hurter's pump, and it appears never to have exceeded 600 times. Mr Cuthbertson has often found the mercury within $\frac{1}{100}$ of an inch of the level in the syphon-gage, indicating a rarefaction of [illegible].

To one end of a glass tube, 2 inches diameter and 30 inches long, was fitted a brass cap and collar of leather, through which a wire was inserted, reaching about two inches within the tube. This was connected with the conductor of an electric machine. The other end was ground flat and set on the pump plate. When the gages indicated a rarefaction of 3000, the light became steady and uniform, of a pale colour, though a little tinged with purple; at [illegible] the light was of a pale dusky white; when [illegible] it disappeared in the middle of the tube, and the tube conducted so well that the prime conductor only gave sparks so faint and short as to be scarcely perceptible. After taking off the tube, and making it as dry as possible, it was again connected with the conductor, which was giving sparks two inches long. When the air in it was rarefied ten times, the sparks were of the same length. Sometimes a pencil of light darted along the tube. When the rarefaction was 20, the spark did not exceed an inch, and light streamed the whole length of the tube. When the rarefaction was 30, the sparks were half an inch, and the light rushed along the tube in great streams. When the rarefaction was 100, the sparks were about [illegible] long, and the light filled the tube in an uninterrupted body. When 300, the appearances were as before. When 600, the sparks were [illegible] and the light was of a faint white colour in the middle, [illegible]

[illegible]

We trust that our readers will not be displeased with the preceding account of our air-pump. [illegible]

We may be allowed to remark, that although this noble instrument originated in Germany, all its improvements [illegible]. The double barrel and gage by Hawkesbee were capital improvements, [illegible] method of making the piston work in rarefied air made a [illegible].

Aided by this machine, we can make experiments [illegible] the air, in a much more [illegible] than could be done by the spontaneous phenomena of nature.

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It allows us in the first place to show the materiality of air in a very [illegible] manner. Bodies cannot move about in the atmosphere without displacing it. This requires force, and [illegible] always diminishes the velocity of bodies moving in it. A heavy body therefore has the velocity of its fall diminished; and if the quantity of air displaced be very great, the diminution will be very considerable. This is the reason why light bodies, such as feathers, fall very slowly. Their moving force is very small, and can therefore displace a great quantity of air only with a very small velocity. But if the same body be dropped *in vacuo*, when there is no air to be displaced, it falls with the whole velocity competent to its gravity. Fig. 44. represents an apparatus by which a guinea and a downy feather are dropped at the same instant, by opening the forceps which holds them by means of the slip-wire in the top of the receiver. If this be done after the air has been pumped out, the guinea and the feather will be observed to reach the bottom at the same instant.

Plate [illegible] fig. 44.

Fig. 45. represents another apparatus for showing the same thing. It consists of two sets of brass vanes put in separate axles, in the manner of windmill sails. One set has their edges placed in the direction of their whirling motion, that is, in a plane to which the axis is perpendicular. The planes of the other set pass through the axis, and they are therefore trimmed so as directly to front the air through which they move. Two springs act upon pins projecting from the axis; and their strength or tensions are so adjusted, that when they are disengaged *in vacuo*, the two sets continue in motion equally long. If they are disengaged in the air, the vanes which beat the air with their planes will stop long before those which cut it edgewise.

We can now extract the air most completely from [illegible] a dry veſſel, ſo as to know the preciſe weight of the air which filled it. The firſt experiment we have of this kind, done with accuracy, is that of Dr Hooke, February 10. 1664, when he found 114 pints of air to weigh 945 grains. One pint of water was $8\frac{7}{12}$ ounces. This gives for the ſpecific gravity of air $\frac{1}{850}$ very nearly.

163 The effect of air on the weight of bodies immerſed in it.

Since we are thus immerſed in a gravitating fluid, it follows, that every body preponderates only with the exceſs of its own weight above that of the air which it diſplaces; for every body loſes by this immerſion the weight of the diſplaced air. A cubic foot loſes about 521 grains in froſty weather. We ſee balloons even riſe in the air, as a piece of cork riſes in water. A maſs of water which really contains 850 pounds will load the ſcale of a balance with 849 only, and will be balanced by about $849\frac{1}{8}$ pounds of braſs. This is evinced by a very pretty experiment, repreſented in fig. 46. A ſmall beam is ſuſpended within a receiver. To one end of the beam is appended a thin glaſs or copper ball, cloſe in every part. This is balanced by a ſmall piece of lead hung on the other arm. As the air is pumped out of the receiver, the ball will gradually preponderate, and will regain its equilibrium when the air is re-admitted.

Fig. 46.

164 Some naturaliſts have propoſed, and actually uſed, a large globe of light make, ſuſpended at a beam, for a barometer. If its capacity be a cubic foot, $1\frac{7}{10}$ grains will indicate the ſame change that is indicated by $\frac{1}{10}$ of an inch of an ordinary barometer. But a veſſel of this ſize will load a balance too much to leave it ſufficiently ſenſible to ſmall changes of denſity. Beſides, it is affected by heat and cold, and would require a very troubleſome equation to correct their effects.

165 It may perhaps be worth while to attend to this in buying and ſelling precious commodities; ſuch as pearls, diamonds, ſilk, and ſome drugs. As they are generally ſold by braſs or leaden weights, the buyer will have ſome advantage when the air is heavy and the barometer high. On the other hand, he will have the advantage in buying gold and mercury when the air is light. It is needleſs to confine this obſervation to precious commodities, for the advantage is the ſame in all in proportion to their levity.

166 There is a caſe in which this obſervation is of conſequence to the philoſopher: we mean the meaſuring of time by pendulums. As the accelerating force on a pendulum is not its whole weight, but the exceſs of its weight over that of the diſplaced air, it follows that a pendulum will vibrate more ſlowly in the air than *in vacuo*. A pendulum compoſed of lead, iron, and braſs, may be about 8400 times heavier than the air which it diſplaces when the barometer is at 30 inches and the thermometer at 32°, and the accelerating force will be diminiſhed about $\frac{1}{16800}$. This will cauſe a ſecond pendulum to make about five vibrations leſs in a day than it would do *in vacuo.* In order therefore to deduce the accelerative power of gravity from the length of a pendulum vibrating in the air, we muſt make an allowance of 0″.17, or $\frac{17}{100}$ of a ſecond, per day for every inch that the barometer ſtands lower than 30 inches. But we muſt alſo note the temperature of the air; becauſe when the air is warm it is leſs denſe when ſupporting by its elaſticity the ſame weight of atmoſphere, and we muſt know how much its denſity is diminiſhed by an increaſe of temperature. The correction is ſtill more complicated; for the change of denſity affects the reſiſtance of the air, and this affects the time of the vibration, and this by a law that is not yet well aſcertained. As far as we can determine from any experiments that have been made, it appears that the change ariſing from the altered reſiſtance takes off about $\frac{2}{5}$ of the change produced by the altered denſity, and that a ſecond pendulum makes but three vibrations a-day more *in vacuo* than in the open air. This is a very unexpected reſult: but it muſt be owned that the experiments have neither been numerous nor very nicely made.

The air-pump alſo allows us to ſhow the effects of the air's preſſure in a great number of amuſing and inſtructive phenomena.

167 Experiments to ſhow the effects of the air's preſſure.

When the air is abſtracted from the receiver, it is ſtrongly preſſed to the pump-plate by the incumbent atmoſphere, and it ſupports this great preſſure in conſequence of its circular form. Being equally compreſſed on all ſides, there is no place where it ſhould give way rather than another; but if it be thin, and not very round, which is ſometimes the caſe, it will be cruſhed to pieces. If we take a ſquare thin phial, and apply an exhauſting ſyringe to its mouth, it will not fail being cruſhed.

As the operation of pumping is ſomething like ſucking, many of theſe phenomena are in common diſcourſe aſcribed to ſuction, a word much abuſed; and this abuſe miſleads the mind exceedingly in its contemplation of natural phenomena. Nothing is more uſual than to ſpeak of the ſuction of a ſyringe, the ſuction and draught of a chimney, &c. The following experiment puts the true cauſe of the ſtrong adheſion of the receiver beyond a doubt.

Fig. 47.

Place a ſmall receiver or cupping-glaſs on the pump-plate without covering the central hole, as repreſented in fig. 47. and cover it with a larger receiver. Exhauſt the air from it; then admit it as ſuddenly as poſſible. The outer receiver, which after the rarefaction adhered ſtrongly to the plate, is now looſe, and the cupping-glaſs will be found ſticking faſt to it. While the rarefaction was going on, the air in the ſmall receiver alſo expanded, eſcaped from it, and was abſtracted by the pump. When the external air was ſuddenly admitted, it preſſed on the ſmall receiver, and forced it down to the plate, and thus ſhut up all entry. The ſmall receiver muſt now adhere; and there can be no ſuction, for the pipe of the pump was on the outſide of the cupping-glaſs.

This experiment ſometimes does not ſucceed, becauſe the air ſometimes finds a paſſage under the brim of the cupping-glaſs. But if the cupping-glaſs be preſſed down by the hand on the greaſy leather or plate, every thing will be made ſmooth, and the glaſs will be ſo little raiſed by the expanſion of its air during the pumping, that it will inſtantly clap cloſe when the air is re-admitted.

168 In like manner, if a thin ſquare phial be furniſhed with a valve, opening from within, but ſhutting when preſſed from without, and if this phial be put under a receiver, and the air be abſtracted from the receiver, the air in the phial will expand during the rarefaction, will eſcape through the valve, and be at laſt in a very rarefied ſtate

within the phial. If the air be now admitted into the receiver, it will preſs on the flat ſides of the included phial and cruſh it to pieces. See fig. 48. Fig. 48.

169 If a piece of wet ox-bladder be laid over the top of a receiver whoſe orifice is about four inches wide, and the air be exhauſted from within it, the incumbent atmoſphere will preſs down the bladder into a hollow form, and then burſt it inward with a prodigious noiſe. See fig. 49. Fig. 49. Or if a piece of thin flat glaſs be laid over the receiver, with an oiled leather between them to make the juncture air-tight, the glaſs will be broken downwards. This muſt be done with caution, becauſe the pieces of glaſs ſometimes fly about with great force.

170 If there be formed two hemiſpherical cups of braſs, with very flat thick brims, and one of them be fitted with a neck and ſtopcock, as repreſented by fig. 50. Fig. 50. the air may be abſtracted from them by ſcrewing the neck into the hole in the pump-plate. To prevent the inſinuation of air, a ring of oiled leather may be put between the rims. Now unſcrew the ſphere from the pump, and fix hooks to each, and ſuſpend them from a ſtrong nail, and hang a ſcale to the loweſt. It will require a conſiderable weight to ſeparate them; namely, about 15 pounds for every ſquare inch of the great circle of the ſphere. If this be four inches diameter, it will require near 190 pounds. This pretty experiment was firſt made by Otto Guericke, and on a very great ſcale. His ſphere was of a large ſize, and when exhauſted the hemiſpheres could not be drawn aſunder by 20 horſes. It was exhibited, along with many others equally curious and magnificent, to the emperor of Germany and his court, at the breaking up of the diet of Ratiſbon in 1654.

171 If the loaded ſyringe mentioned in N° 16. be ſuſpended by its piſton from the hook in the top plate of the receiver, as in fig. 51. Fig. 51. and the air be abſtracted by the pump, the ſyringe will gradually deſcend (becauſe the elaſticity of the air, which formerly balanced the preſſure of the atmoſphere, is now diminiſhed by its expanſion, and is therefore no longer able to preſs the ſyringe to the piſton), and it will at laſt drop off. If the air be admitted before this happens, the ſyringe will immediately riſe again.

172 Screw a ſhort braſs pipe into the neck of a tranſporter, N° 107. on which is ſet a tall receiver, and immerſe it into a ciſtern of water. On opening the cock the preſſure of the air on the ſurface of the water in the ciſtern will force it up through the pipe, and cauſe it to ſpout into the receiver with a ſtrong jet, becauſe there is no air within to balance by its elaſticity the preſſure of the atmoſphere. See fig. 52. Fig. 52.

173 By means of this preſſure the gage of an air-pump acts.

It is in the ſame way that the gage of the air-pump performs its office. The preſſure of the atmoſphere raiſes the mercury in the gage till the weight of the mercury, together with the remaining elaſticity of the air in the receiver, are in equilibrio with the whole preſſure of the atmoſphere: therefore the height and weight of the mercury in the gage is the exceſs of the weight of the atmoſphere above the elaſticity of the included air; and the deficiency of this height from that of the mercury in the Toricellian tube is the meaſure of this remaining elaſticity.

174 If a Toricellian tube be put under a tall receiver, as ſhown in fig. 53. Fig. 53. and the air be exhauſted, the mercury in the tube will deſcend while that in the gage will riſe; and the ſum of their heights will always be the ſame, that is, equal to the height in an ordinary barometer. The height of the mercury in the receiver is the effect and meaſure of the remaining elaſticity of the included air, and the height in the pump-gage is the unbalanced preſſure of the atmoſphere. This is a very inſtructive experiment, perfectly ſimilar to Mr Auzout's, mentioned in N° 34. and completely eſtabliſhes and illuſtrates the whole doctrine of atmoſpheric preſſure.

175 Water riſes in pumps,

We get a ſimilar illuſtration and confirmation (if ſuch a thing be now needed) of the cauſe of the riſe of water in pumps, by ſcrewing a ſyringe into the top plate of a receiver, which ſyringe has a ſhort glaſs pipe plunging into a ſmall cup of water. See fig. 54. Fig. 54. When the piſton-rod is drawn up, the water riſes in the glaſs pipe, as in any other pump, of which this is a miniature repreſentation. But if the air has been previouſly exhauſted from the receiver, there is nothing to preſs on the water in the little jar; and it will not riſe in the glaſs pipe though the piſton of the ſyringe be drawn to the top.

176 and moves in ſyphons.

Analogous to the riſe of water in pumps is its riſe and motion in ſyphons. Suppoſe a pipe ABCD, fig. 55. Fig. 55. bent at right angles at B and C, and having its two ends immerſed in the ciſterns of water A and D. Let the leg CD be longer than the leg BA, and let the whole be full of water. The water is preſſed upwards at A with a force equal to the weight of the column of air E A reaching to the top of the atmoſphere; but it is preſſed downwards by the weight of the column of water B A. The water at E is preſſed downwards by the weight of the column CD, and upwards by the weight of the column of air FD reaching to the top of the atmoſphere. The two columns of air differ very little in their weight, and may without any ſenſible error be conſidered as equal. Therefore there is a ſuperiority of preſſure downwards at D, and the water will flow out there. The preſſure of the air will raiſe the water in the leg AB, and thus the ſtream will be kept up till the veſſel A is emptied as low as the orifice of the leg BA, provided the height of AB is not greater than what the preſſure of the atmoſphere can balance, that is, does not exceed 32 or 33 feet for water, 30 inches for mercury, &c.

A ſyphon then will always run from that veſſel whoſe ſurface is higheſt; the form of the pipe is indifferent, becauſe the hydroſtatical preſſures depend on the vertical height only. It muſt be filled with water by ſome other contrivance, ſuch as a funnel, or a pump applied a-top; and the funnel muſt be ſtopped up, otherwiſe the air would get in, and the water would fall in both legs.

177 If the ſyphon have equal legs, as in fig. 56. Fig. 56. and be turned up at the ends, it will remain full of water, and be ready for uſe. It need only be dipped into any veſſel of water, and the water will then flow out at the other end of the ſyphon. This is called the *Wirtemberg ſyphon*, and is repreſented in fig. 56. Syphons will afterwards be conſidered more minutely under the title of *PNEUMATICAL Engines*, at the end of this article.

178 The ſyphon fountain.

What is called the *ſyphon fountain*, conſtructed on this principle, is ſhown in fig. 57. Fig. 57. where AB is a tall receiver, ſtanding in a wide baſon DE, which is ſupported on the pedeſtal H by the hollow pillar FG. In the centre of the receiver is a jet pipe C, and in the top a ground ſtopper A. Near the baſe of the pillar is a cock N, and in the pedeſtal is another cock O.

Fig.

Fill the baſon DE with water within half an inch of the brim. Then pour in water at the top of the receiver (the cock N being ſhut) till it is about half full, and then put in the ſtopper. A little water will run out into the veſſel DE. But before it runs over, open the cock N, and the water will run into the ciſtern H; and by the time that the pipe C appears above water, a jet will riſe from it, and continue as long as water is ſupplied from the baſon DE. The paſſage into the baſe ciſtern may be ſo tempered by the cock N that the water within the receiver ſhall keep at the ſame height, and what runs into the baſe may be received from the cock O into another veſſel, and returned into DE, to keep up the ſtream.

179 Manner of its conſtruction and operation. Fig. 58.

This pretty philoſophical toy may be conſtructed in the following manner. BB, fig. 58. is the ferril or cap into which the receiver is cemented. From its centre deſcends the jet pipe C*a* ſloping outwards, to give room for the diſcharging pipe *bd* of larger diameter, whoſe lower extremity *d* fits tightly into the top of the hollow pillar FG.

Fig. 57.

The operation of the toy is eaſily underſtood. Suppoſe the diſtance from C to H (fig. 57.) three feet, which is about $\frac{1}{11}$ of the height at which the atmoſphere would ſupport a column of water. The water poured into AB would deſcend through FG (the hole A being ſhut) till the air has expanded $\frac{1}{10}$, and then it would ſtop. If the pipe C*a* be now opened, the preſſure of the air on the ſurface of the water in the ciſtern DE will cauſe it to ſpout through C to the height of three feet nearly, and the water will continue to deſcend through the pipe FG. By tempering the cock N ſo as to allow the water to paſs through it as faſt as it is ſupplied by the jet, the amuſement may be continued a long time. It will ſtop at laſt, however; becauſe, as the jet is made into rarefied air, a little air will be extricated from the water, which will gradually accumulate in the receiver, and diminiſh its rarefaction, which is the moving cauſe of the jet. This indeed is an inconvenience felt in every employment of ſyphons, ſo much the more remarkably as their top is higher than the ſurface of the water in the ciſtern of ſupply.

180 Syphons are often uſed thus. Fig. 59.

Caſes of this employment of a ſyphon are not unfrequent. When water collected at A (fig. 59.) is to be conducted in a pipe to C, ſituated in a lower part of the country, it ſometimes happens, as between Lochend and Leith, that the intervening ground is higher than the fountain-head as at B. A forcing pump is erected at A, and the water forced along the pipe. Once it runs out at C, the pump may be removed, and the water will continue to run on the ſyphon principle, provided BD do not exceed 33 feet. But the water in that part of the conduit which is above the horizontal plane AD, is in the ſame ſtate as in a receiver of rarefied air, and gives out ſome of the air which is chemically united with it. This gradually accumulates in the elevated part of the conduit, and at laſt choaks it entirely. When this happens, the forcing pump muſt again be worked. Although the elevation in the Leith conduit is only about eight or ten feet, it will ſeldom run for 12 hours. N. B. This air cannot be diſcharged by the uſual air-cocks; for if there were an opening at B, the air would ruſh in, and immediately ſtop the motion.

181 The air-pump diſcovers the combination of air with water,

This combination of air with water is very diſtinctly ſeen by means of the air-pump. If a ſmall glaſs containing cold water, freſh drawn from the ſpring, be expoſed, as in fig. 60. under the receiver, and the air rarefied, ſmall bubbles will be obſerved to form on the inner ſurface of the glaſs, or on the ſurface of any body immerſed in it, which will increaſe in ſize, and then detach themſelves from the glaſs and reach the top; as the rarefaction advances, the whole water begins to ſhow very minute air-bubbles riſing to the top; and this appearance will continue for a very long time, till it is completely diſengaged. Warming the water will occaſion a ſtill farther ſeparation of air, and a boiling heat will ſeparate all that can be diſengaged. The reaſon aſſigned for theſe air-bubbles firſt appearing on the ſurface of the glaſs, &c. is, that air is attracted by bodies, and adheres to their ſurface. This may be ſo. But it is more probably owing to the attraction of the water for the glaſs, which cauſes it to quit the air which it held in ſolution, in the ſame manner as we ſee it happen when it is mixed with ſpirits-of-wine, with vitriolic acid, &c. or when ſalts or ſugar are diſſolved in it. For if we pour out the water which has been purged of air by boiling *in vacuo*, and fill the glaſs with freſh water, we ſhall obſerve the ſame thing, although a film of the purified water was left adhering to the glaſs. In this caſe there can be no air adhering to the glaſs.

Plate CCCCXXX. fig. 60.

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Water thus purged of air by boiling (or even without boiling) *in vacuo*, will again abſorb air when expoſed to the atmoſphere. The beſt demonſtration of this is to fill with this water a phial, leaving about the ſize of a pea not filled. Immerſe this in a veſſel of water, with the mouth undermoſt, by which means the air-bubble will mount up to the bottom of the phial. After ſome days ſtanding in this condition, the air-bubble will be completely abſorbed, and the veſſel quite filled with water.

The air in this ſtate of chemical ſolution has loſt its elaſticity, for the water is not more compreſſible than common water. It is alſo found that water brought up from a great depth under ground contains much more air than water at the ſurface. Indeed fountain waters differ exceedingly in this reſpect. The water which now comes into the city of Edinburgh by pipes contains ſo much as to throw it into a conſiderable ebullition *in vacuo*. Other liquors contain much greater quantities of elaſtic fluids in this looſely combined ſtate. A glaſs of beer treated in the ſame way will be almoſt wholly converted into froth by the eſcape of its fixed air, and will have loſt entirely the prickling ſmartneſs which is ſo agreeable, and become quite vapid.

183 and illuſtrates the air's elaſticity and expanſibility.

The air-pump gives us, in the next place, a great variety of experiments illuſtrative of the air's elaſticity and expanſibility. The very operation of exhauſtion, as it is called, is an inſtance of its great, and hitherto unlimited, expanſibility. But this is not palpably exhibited to view. The following experiments ſhow it moſt diſtinctly.

184 Experiments ſhowing theſe properties.

1ſt, Put a flaccid bladder, of which the neck is firmly tied with a thread, under a receiver, and work the pump. The bladder will gradually ſwell, and will even be fully diſtended. Upon readmitting the air into the receiver, the bladder gradually collapſes again into its former dimenſions: while the bladder is flaccid, the air within it is of the ſame denſity and elaſticity with the ſurrounding air, and its elaſticity balances the preſſure of the atmoſphere. When part of the air of the receiver is abſtracted, the remainder expands ſo as ſtill to fill the receiver: but by expanding, its elaſticity is plainly diminiſhed; for we ſee by the fact, that the elaſticity of the air of the receiver no longer balances the elaſticity of that in the bladder, as it no longer keeps it in its dimenſions. The air in the bladder expands alſo: it expands till its diminiſhed elaſticity is again in equilibrio with the diminiſhed elaſticity of the air in the receiver; that is, till its denſity is the ſame. When all the wrinkles of the bladder have diſappeared, its air can expand no more, although we continue to diminiſh the elaſticity of the air of the receiver by further rarefaction. The bladder now tends to burſt; and if it be pierced by a point or knife faſtened to the ſlip-wire, the air will ruſh out, and the mercury deſcend rapidly in the gage.

185 If a phial or tube be partly filled with water, and immerſed in a veſſel of water with the mouth downwards, the air will occupy the upper part of the phial. If this apparatus be put under a receiver, and the air be abſtracted, the air in the phial will gradually expand, allowing the water to run out by its weight till the ſurface of the water be on a level within and without. When this is the caſe, we muſt grant that the denſity and elaſticity of the air in the phial is the ſame with that in the receiver. When we work the pump again, we ſhall obſerve the air in the phial expand ſtill more, and come out of the water in bubbles. Continuing the operation, we ſhall ſee the air continually eſcaping from the phial: when this is over, it ſhows that the pump can rarefy no more. If we now admit the air into the receiver, we ſhall ſee the water riſe into the phial, and at laſt almoſt completely fill it, leaving only a very ſmall bubble of air at top. This bubble had expanded ſo as to fill the whole phial. See this repreſented in fig. 61. Fig 61.

186 Every one muſt have obſerved a cavity at the big end of an egg between the ſhell and the white. The white and yolk are contained in a thin membrane or bladder which adheres looſely to the ſhell, but is detached from it at that part; and this cavity increaſes by keeping the egg in a dry place. One may form a judgement of its ſize, and therefore of the freſhneſs of the egg, by touching it with the tongue; for the ſhell, where it is not in contact with the contents, will preſently feel warm, being quickly heated by the tongue, while the reſt of the egg will feel cold.

If a hole be made in the oppoſite end of the egg, and it be ſet on a little tripod, and put under a receiver, the expanſion of the air in the cavity of the egg will force the contents through the hole till the egg be quite emptied: or, if nearly one half of the egg be taken away at the other end, and the white and yolk taken out, and the ſhell be put under a receiver, and the air abſtracted, the air in the cavity of the egg will expand, gradually detaching the membrane from the ſhell, till it cauſes it to ſwell out, and gives the whole the appearance of an entire egg. In like manner ſhrivelled apples and other fruits will ſwell in vacuo by the expanſion of the air confined in their cavities.

187 If a piece of wood, a twig with green leaves, charcoal, plaſter of Paris, &c. be kept under water in vacuo, a prodigious quantity of air will be extracted; and if we readmit the air into the receiver, it will force the water into the pores of the body. In this caſe the body will not ſwim in water as it did before, ſhowing that the vegetable fibres are ſpecifically heavier than water. It is found, however, that the air contained in the pith and bark, ſuch as cork, is not all extricated in this way; and that much of it is contained in veſicles which have no outlet: being ſecreted into them in the proceſs of vegetation, as it is ſecreted into the air-bladder of fiſhes, where it is generally found in a pretty compreſſed ſtate, conſiderably denſer than the ſurrounding air. The air-bladder of a fiſh is ſurrounded by circular and longitudinal muſcles, by which the fiſh can compreſs the air ſtill further; and, by ceaſing to act with them, allow it to ſwell out again. It is in this manner that the fiſh can ſuit its ſpecific gravity to its ſituation in the water, ſo as to have no tendency either to riſe or ſink: but if the fiſh be put into the receiver of an air-pump, the rarefaction of the air obliges the fiſh to act more ſtrongly with theſe contracting muſcles, in order to adjuſt its ſpecific gravity; and if too much air has been abſtracted from the receiver, the fiſh is no longer able to keep its air-bladder in the proper degree of compreſſion. It becomes therefore too buoyant, and comes to the top of the water, and is obliged to ſtruggle with its tail and fins in order to get down; frequently in vain. The air-bladder ſometimes burſts, and the fiſh goes to the bottom, and can no longer keep above without the continual action of its tail and fins. When fiſhes die, they commonly float at top, their contractive action being now at an end. All this may be illuſtrated (but very imperfectly) by a ſmall half blown bladder, to which is appended a bit of lead, juſt ſo heavy as to make it ſink in water: when this is put under a receiver, and the air abſtracted, the bubble will riſe to the top; and, by nicely adjuſting the rarefaction, it may be kept at any height. See fig. 62. Fig. 62.

Compreſſibility, &c.

188 The playthings called *Carteſian devils* are ſimilar to this: they are hollow glaſs figures, having a ſmall aperture in the lower part of the figures, as at the point of the foot; their weight is adjuſted ſo that they ſwim upright in water. When put into a tall jar filled to the top, and having a piece of leather tied over it, they will ſink in the water, by preſſing on the leather with the ball of the hand: this, by compreſſing the water, forces ſome of it to enter into the figure and makes it heavier than the water; for which reaſon it ſinks, but riſes again on removing the preſſure of the hand. See figs. 63 and 64. Fig. 63. and 64.

If a half blown ox-bladder be put into a box, and great weights laid on it, and the whole be put under a receiver, and the air abſtracted; the air will, by expanding, lift up the weights, though above an hundred pounds. See fig. 65. Fig. 65.

189 Compreſſibility and expanſibility are in no ſtate of the air very diſſimilar.

By ſuch experiments the great expanſibility of the air is abundantly illuſtrated, as its compreſſibility was formerly by means of the condenſing ſyringe. We now ſee that the two ſets of experiments form an uninterrupted chain; and that there is no particular ſtate of the air's denſity where the compreſſibility and expanſibility are remarkably diſſimilar. Air in its ordinary ſtate expands; becauſe its ordinary ſtate is a ſtate of compreſſion by the weight of the atmoſphere: and if there were a pit about 33 miles deep, the air at the bottom would probably be as denſe as water; and if it were 50 miles deep, it would be as denſe as gold, if it did not become a liquid before this depth: nay, if a bottle with its mouth undermoſt were immerſed ſix miles under water, it would probably be as denſe as water; we may probably, for this depends on the nature of its compreſſibility; that is, on the relation which ſubſiſts between the compreſſion and the force which produces it.

190
Relation between compreſſion and the force producing it.

This is the circumſtance of its conſtitution, which we now proceed to examine; and it is evidently a very important circumſtance. We have long ago obſerved, that the great compreſſibility and permanent fluidity of air, obſerved in a vaſt variety of phenomena, is totally inexplicable, on the ſuppoſition that the particles of air are like ſo many balls of ſponge or ſo many foot-balls. Give to thoſe what compreſſibility you pleaſe, common air could no more be fluid than a maſs of clay; it could no more be fluid than a maſs of ſuch balls preſſed into a box. It can be demonſtrated (and indeed hardly needs a demonſtration), that before a parcel of ſuch balls, juſt touching each other, can be ſqueezed into half their preſent dimenſions, their globular ſhape will be entirely gone, and each will have become a perfect cube, touching ſix other cubes with its whole ſurface; and theſe cubes will be ſtrongly compreſſed together, ſo that motion could never be performed through among them by any ſolid body without a very great force. Whereas we know that in this ſtate air is juſt as permeable to every body as the common air that we breathe. There is no way in which we can repreſent this fluidity to our imagination, but by conceiving air to conſiſt of particles, not only diſcrete, but diſtant from each other, and actuated by repulſive forces, or ſomething analogous to them. It is an idle ſubterfuge, to which ſome naturaliſts have recourſe, ſaying, that they are kept aſunder by an intervening ether, or elaſtic fluid of any other name. This is only removing the difficulty a ſtep farther off: for the elaſticity of this fluid requires the ſame explanation; and therefore it is neceſſary, in obedience to the rules of juſt reaſoning, to begin the inquiry here; that is, to determine from the phenomena what is the analogy between the diſtances of the particles and the repulſive forces exerted at theſe diſtances, proceeding in the ſame way as in the examination of planetary gravitation. We ſhall learn the analogy by attending to the analogy between the compreſſing force and the denſity.

191
Denſity explained as applied to air.

For the denſity depends on the diſtance between the particles; the nearer they are to each other, the denſer is the air. Suppoſe a ſquare pipe one inch wide and eight inches long, ſhut at one end, and filled with common air; then ſuppoſe a plug ſo nicely fitted to this pipe that no air can paſs by its ſides; ſuppoſe this piſton thruſt down to within an inch of the bottom: it is evident that the air which formerly filled the whole pipe now occupies the ſpace of one cubic inch, which contains the ſame number of particles as were formerly diffuſed over eight cubic inches.

The condenſation would have been the ſame if the air which fills a cube whoſe ſide is two inches had been ſqueezed into a cube of one inch, for the cube of two inches alſo contains eight inches. Now, in this caſe it is evident that the diſtance between the particles would be reduced to its half in every direction. In like manner, if a cube whoſe ſide is three inches, and which therefore contains 27 inches, be ſqueezed into one inch, the diſtance of the particles will be one-third of what it was: in general the diſtance of the particles will be as the cube-root of the ſpace into which they are compreſſed. If the ſpace be $\frac{1}{8}$, $\frac{1}{27}$, $\frac{1}{64}$, $\frac{1}{125}$, &c. of its former dimenſions, the diſtance of the particles will be $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. Now the term *denſity*, in its ſtrict ſenſe, expreſſes the vicinity of the particles; *denſæ arbores* are trees growing near each other. The meaſure of this vicinity therefore is the true meaſure of the denſity; and when 27 inches of air are compreſſed into one, we ſhould ſay that it is three times as denſe; but we ſay, that it is 27 times denſer.

192
Farther explanation

Denſity is therefore uſed in a ſenſe different from its ſtricteſt acceptation: it expreſſes the comparative number of equidiſtant particles contained in the ſame bulk. This is alſo abundantly preciſe, when we compare bodies of the ſame kind, differing in denſity only; but we alſo ſay, that gold is 19 times denſer than water, becauſe the ſame bulk of it is 19 times heavier. This aſſertion proceeds on the aſſumption, or the fact, that every ultimate atom of terreſtrial matter is equally heavy: a particle of gold may contain more or fewer atoms of matter than a particle of water. In ſuch a caſe, therefore, the term denſity has little or no reference to the vicinity of the particles; and is only a term of compariſon of other qualities or accidents.

But when we ſpeak of the reſpective denſities of the ſame ſubſtance in its different ſtates of compreſſion, the word *denſity* is ſtrictly connected with vicinity of particles, and we may ſafely take either of the meaſures. We ſhall abide by the common acceptation, and call that air eight times as denſe which has eight times as many particles in the ſame bulk, although the particles are only twice as near to each other.

193
The analogy between the compreſſing force and the diſtance of the particles, &c.

Thus then we ſee, that by obſerving the analogy between the compreſſing force and the denſity, we ſhall diſcover the analogy between the compreſſing force and the diſtance of the particles. Now the force which is neceſſary for compreſſing two particles of air to a certain vicinity is a proper meaſure of the elaſticity of the particles correſponding to that vicinity or diſtance; for it balances it, and forces which balance muſt be eſteemed equal. Elaſticity is a diſtinctive name for that corpuſcular force which keeps the particles at that diſtance: therefore obſervations made on the analogy between the compreſſing force and the denſity of air will give us the law of its corpuſcular force, in the ſame way that obſervations on the ſimultaneous deflections of the planets towards the ſun give us the law of celeſtial gravitation.

194

But the ſenſible compreſſing forces which we are able to apply is at once exerted on unknown thouſands of particles, while it is the law of action of a ſingle particle that we want to diſcover. We muſt therefore know the *proportion* of the numbers of particles on which the compreſſing force is exerted. It is eaſy to ſee, that ſince the diſtance of the particles is as the cube root of the denſity inverſely, the number of particles in phyſical contact with the compreſſing ſurface muſt be as the ſquare of this root. Thus when a cube of 8 inches is compreſſed into one inch, and the particles are twice as near each other as they were before, there muſt be four times the number of particles in contact with each of the ſides of this cubical inch; or, when we have puſhed down the ſquare piſton of the pipe ſpoken of above to within an inch of the bottom, there will be four times the number of particles *immediately* contiguous to the piſton, and reſiſting the compreſſion; and in order to obtain the force really exerted on one particle, and the elaſticity of that particle, we muſt divide the whole compreſſing

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preſſing force by 4. In like manner, if we have compreſſed air into $\frac{1}{9}$ of its former bulk, and brought the particles to $\frac{1}{3}$ of their former diſtance, we muſt divide the compreſſing force by 9. In general if d expreſs the denſity, $\frac{1}{\sqrt[3]{d}}$ will expreſs the diſtance x of the particles; $\sqrt[3]{d}$, or $d^{\frac{1}{3}}$, will expreſs the vicinity or real denſity; and $d^{\frac{2}{3}}$ will expreſs the number of particles acting on the compreſſing ſurface; and if f expreſs the accumulated external compreſſing force, $\frac{f}{d^{\frac{2}{3}}}$ will expreſs the force acting on one particle; and therefore the elaſticity of that particle correſponding to the diſtance x.

195 Experiments eſtabliſhing the law of compreſſion.

We may now proceed to conſider the experiments by which the law of compreſſion is to be eſtabliſhed.

The firſt experiments to this purpoſe were thoſe made by Mr Boyle, publiſhed in 1661 in his *Defenſio Doctrinæ de Aeris Elatere contra Linum*, and exhibited before the Royal Society the year before. Mariotte made experiments of the ſame kind, which were publiſhed in 1676 in his *Eſſai ſur la Nature de l'Air* and *Traité des Mouvemens des Eaux*. The moſt copious experiments are thoſe by Sulzer (*Mem. Berlin.* ix.), thoſe by Fontana (*Opuſc. Phyſico-Math.*), and thoſe by Sir George Shuckburgh and Gen. Roy.

196 Compreſſibility of air not rarer than the atmoſphere at the earth's ſurface. Fig. 66.

In order to examine the compreſſibility of air that is not rarer than the atmoſphere at the ſurface of the earth, we employ a bent tube or ſyphon ABCD (fig. 66.), hermetically ſealed at A and open at D. The ſhort leg AB muſt be very accurately divided in the proportion of its ſolid contents, and fitted with a ſcale whoſe units denote equal increments, not of length, but of capacity. There are various ways of doing this; but it requires the moſt ſcrupulous attention, and without this the experiments are of no value. In particular, the arched form at A muſt be noticed. A ſmall quantity of mercury muſt then be poured into the tube, and paſſed backwards and forwards till it ſtands (the tube being held in a vertical poſition) on a level at B and C. Then we are certain that the included air is of the ſame denſity with that of the contiguous atmoſphere. Mercury is now poured into the leg DC, which will fill it, ſuppoſe to G, and will compreſs the air into a ſmaller ſpace AE. Draw the horizontal line EF: the new bulk of the compreſſed air is evidently AE, meaſured by the adjacent ſcale, and the addition made to the compreſſing force of the atmoſphere is the weight of the column GF. Produce GF downwards to H, till FH is equal to the height ſhown by a Toricellian tube filled with the *ſame mercury*; then the whole compreſſing force is HG. This is evidently the meaſure of the elaſticity of the compreſſed air in AE, for it balances it. Now pour in more mercury, and let it riſe to g, compreſſing the air into Ae. Draw the horizontal line ef, and make fh equal to FH; then Ae will be the new bulk of the compreſſed air, $\frac{\text{AB}}{\text{A}e}$ will be its new denſity, and hg will be the meaſure of the new elaſticity. This operation may be extended as far as we pleaſe, by lengthening the tube CD, and adding more mercury. It is ſufficiently eaſy to attain the great preſſures. Great care muſt be taken to keep the apparatus in a conſtant temperature, becauſe the elaſticity of air is greatly affected by heat, and the change by any increaſe of temperature is different according to its denſity or compreſſion.

197 Experiments of Boyle, &c. neither accurate nor extended to very great compreſſions.

The experiments of Boyle, Mariotte, Muſſchenbroek, and others, were not extended to very great compreſſions, the denſity of the air not having been increaſed by any of them more than four times; nor do they ſeem to have been made with very great nicety. It may be collected from them in general, that the elaſticity of the air is very nearly proportioned to its denſity; and accordingly this law was almoſt immediately acquieſced in, and was called the *Boylean law*: it is accordingly adopted by almoſt all writers on the ſubject as exact. Of late years, however, there occurred queſtions in which it was of importance that this point ſhould be more ſcrupulouſly ſettled, and the former experiments were repeated and extended. Sulzer and Fontana have carried them farther than any other. Sulzer compreſſed air into one-eighth of its former dimenſions.

198 Varieties, &c. in theſe experiments.

Conſiderable varieties and irregularities are to be obſerved in theſe experiments. It is extremely difficult to preſerve the temperature of the apparatus, particularly of the leg AB, which is moſt handled. A great quantity of mercury muſt be employed; and it does not appear that philoſophers have been careful to have it preciſely ſimilar to that in the barometer, which gives us the unit of compreſſing force and of elaſticity. The mercury in the barometer ſhould be pure and boiled. If the mercury in the ſyphon is adulterated with biſmuth and tin, which it commonly is to a conſiderable degree, the compreſſing force, and conſequently the elaſticity, will appear greater than the truth. If the barometer has not been nicely fitted, it will be lower than it ſhould be, and the compreſſing force will appear too great, becauſe the unit is too ſmall; and this error will be moſt remarkable in the ſmaller compreſſions.

199 Heterogeneous nature of the air the greateſt ſource of error.

The greateſt ſource of error and irregularity in the experiments is the very heterogeneous nature of the air itſelf. Air is a ſolvent of all fluids, all vapours, and perhaps of many ſolid bodies. It is highly improbable that the different compounds ſhall have the ſame elaſticity, or even the ſame law of elaſticity: and it is well known, that air, loaded with water or other volatile bodies, is much more expanſible by heat than pure air; nay, it would appear from many experiments, that certain determinate changes both of denſity and of temperature, cauſe air to let go the vapours which it holds in ſolution. Cold cauſes it to precipitate water, as appears in dew; ſo does rarefaction, as is ſeen in the receiver of an air-pump.

200 The elaſticity does not increaſe ſo faſt as the denſity.

In general, it appears that the elaſticity of air does not increaſe quite ſo faſt as its denſity. This will be beſt ſeen by the following tables, calculated from the experiments of Mr Sulzer. The column E in each ſet of experiments expreſſes the length of the compreſſing column GH, the unit being FH, while the column D expreſſes $\frac{\text{AB}}{\text{AE}}$.

1ſt Set.		2d Set.		3d Set.	
D	E	D	E	D	E
1.000	1.000	1.000	1.000	1.000	1.000
1.100	1.093	1.236	1.224	1.091	1.076
1.222	1.211	1.294	1.288	1.200	1.183
1.375	1.284	1.375	1.332	1.333	1.303
1.571	1.559	1.466	1.417	1.500	1.472
1.692	1.669	1.571	1.515	1.714	1.659
1.833	1.796	1.692	1.647		
2.000	1.958	2.000	1.964	2.000	1.900
2.288	2.130				
2.444	2.375	2.444	2.392	2.400	2.241
3.143	2.936	3.143	3.078	3.000	2.793
3.666	3.391	3.666	3.575		
4.000	3.706			4.000	3.631
4.444	4.035	4.444	4.320		
4.888	4.438				
5.500	4.922	5.500	5.096		
5.882	5.522			6.000	5.297
		7.333	6.694		
				8.000	6.835

There appears in theſe experiments ſufficient grounds
201 for calling in queſtion the Boylean law; and the writer of this article thought it incumbent on him to repeat them with ſome precautions, which probably had not been attended to by Mr Sulzer. He was particularly anxious to have the air as free as poſſible from moiſture. For this purpoſe, having detached the ſhort leg of the ſyphon, which was 34 inches long, he boiled mercury in it, and filled it with mercury boiling hot. He took a tinplate veſſel of ſufficient capacity, and put into it a quantity of powdered quicklime juſt taken from the kiln; and having cloſed the mouth, he agitated the lime through the air in the veſſel, and allowed it to remain there all night. He then emptied the mercury out of the ſyphon into this veſſel, keeping the open end far within it. By this means the ſhort leg of the ſyphon was filled with very dry air. The other part was now joined, and boiled mercury put into the bend of the ſyphon; and the experiment was then proſecuted with mercury which had been recently boiled, and was the ſame with which the barometer had been carefully filled.

202 The reſults of the experiments are expreſſed in the following table.

Dry Air.		Moiſt Air.		Damp Air.	
D	E	D	E	D	E
1.000	1.000	1.000	1.000	1.000	1.000
2.000	1.957	2.000	1.920	2.000	1.909
3.000	2.848	3.000	2.839	3.000	2.845
4.000	3.737	4.000	3.726	4.000	3.718
5.500	4.930	5.500	5.000	5.500	5.104
6.000	5.342	6.000	5.452	6.000	5.463
7.620	6.490	7.620	6.775	7.620	6.812

Here it appears again in the cleareſt manner that the elaſticities do not increaſe as faſt as the denſities, and the differences are even greater than in Mr Sulzer's experiments.

203 The ſecond table contains the reſults of experiments made on very damp air in a warm ſummer's morning. In theſe it appears that the elaſticities are almoſt preciſely proportional to the denſities + a ſmall conſtant quantity, nearly 0.11, deviating from this rule chiefly between the denſities 1 and 1.5, within which limits we have very nearly $D=E^{1.0017}$. As this air is nearer to the conſtitution of atmoſpheric air than the former, this rule may be ſafely followed in caſes where atmoſpheric air is concerned, as in meaſuring the depths of pits by the barometer.

204 The third table ſhows the compreſſion and elaſticity of air ſtrongly impregnated with the vapours of camphire. Here the Boylean law appears pretty exact, or rather the elaſticity ſeems to increaſe a little faſter than the denſity.

205 Dr Hooke examined the compreſſion of air by immerſing a bottle to great depths in the ſea, and weighing the water which got into it without any eſcape of air. But this method was liable to great uncertainty, on account of the unknown temperature of the ſea at great depths.

Mode of examining the elaſticity of rarefied air.

206 Hitherto we have conſidered only ſuch air as is not rarer than what we breathe; we muſt take a very different method for examining the elaſticity of rarefied air.

Fig. 67.

Let *g h* (fig. 67.) be a long tube, formed a-top into a cup, and of ſufficient diameter to receive another ſmaller tube *af*, open at firſt at both ends. Let the outer tube and cup be filled with mercury, which will riſe in the inner tube to the ſame level. Let *af* now be ſtopped at *a*. It contains air of the ſame denſity and elaſticity with the adjoining atmoſphere. Note exactly the ſpace *a b* which it occupies. Draw it up into the poſition of fig. 68. and let the mercury ſtand in it at the height *de*, while *ce* is the height of the mercury in the barometer. It is evident that the column *de* is in equilibrio between the preſſure of the atmoſphere and the elaſticity of the air included in the ſpace *ad*. And ſince the weight of *ce* would be in equilibrio with the whole preſſure of the atmoſphere, the weight of *cd* is equivalent to the elaſticity of the included air. While therefore *ce* is the meaſure of the elaſticity of the ſurrounding atmoſphere, *cd* will be the meaſure of the elaſticity of the included air; and ſince the air originally occupied the ſpace *ab*, and has now expanded into *ad*, we have $\frac{ab}{ad}$ for the meaſure of its denſity. N. B. *ce* and *cd* are meaſured by the *perpendicular heights* of the columns, but *ab* and *ad* muſt be meaſured by their *ſolid capacities*.

Fig. 68.

207 By raiſing the inner tube ſtill higher, the mercury will alſo riſe higher, and the included air will expand ſtill farther, and we obtain another *cd*, and another $\frac{ab}{ad}$; and in this manner the relation between the denſity and elaſticity of rarefied air may be diſcovered.

An eaſier method by means of the air-pump. Fig. 69.

208 This examination may be managed more eaſily by means of the air-pump. Suppoſe a tube *a e* (fig. 69.) containing a ſmall quantity of air *a b*, ſet up in a ciſtern of mercury, which is ſupported in the tube at the height *e b*,

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e b, and let *e c* be the height of the mercury in the barometer. Let this apparatus be ſet under a tubulated receiver on the pump plate, and let *g n* be the pump-gage, and *m n* be made equal to *c e*.

Then, as has been already ſhown, *c b* is the meaſure of the elaſticity of the air in *a b*, correſponding to the bulk *a b*. Now let ſome air be abſtracted from the receiver. The elaſticity of the remainder will be diminiſhed by its expanſion; and therefore the mercury in the tube *a c* will deſcend to ſome point *d*. For the ſame reaſon, the mercury in the gage will riſe to ſome point *o*, and *m o* will expreſs the elaſticity of the air in the receiver. This would ſupport the mercury in the tube *a c* at the height *e r*, if the ſpace *a r* were entirely void of air. Therefore *r d* is the effect and meaſure of the elaſticity of the included air when it has expanded to the bulk *a d*; and thus its elaſticity, under a variety of other bulks, may be compared with its elaſticity when of the bulk *a b*. When the air has been ſo far abſtracted from the receiver that the mercury in *a e* deſcends to *e*, then *m o* will be the preciſe meaſure of its elaſticity.

In all theſe caſes it is neceſſary to compare its bulk *a b* with its natural bulk, in which its elaſticity balances the preſſure of the atmoſphere. This may be done by laying the tube *a e* horizontally, and then the air will collapſe into its ordinary bulk.

209 Another eaſy method. Fig 70.

Another eaſy method may be taken for this examination. Let an apparatus *a b c d e f* (fig. 70.) be made, conſiſting of a horizontal tube *a c* of even bore, a ball *d g e* of a large diameter, and a ſwan-neck tube *h f*. Let the ball and part of the tube *g e b* be filled with mercury, ſo that the tube may be in the ſame horizontal plane with the ſurface *d e* of the mercury in the ball. Then ſeal up the end *a*, and connect *f* with an air-pump. When the air is abſtracted from the ſurface *d e*, the air in *a b* will expand into a larger bulk *a c*, and the mercury in the pump-gage will riſe to ſome diſtance below the barometric height. It is evident that this diſtance, without any farther calculation, will be the meaſure of the elaſticity of the air preſſing on the ſurface *d e*, and therefore of the air in *a c*.

210 The moſt exact mode of examining this elaſticity.

The moſt exact of all methods is to ſuſpend in the receiver of an air-pump a glaſs veſſel, having a very narrow mouth, over a ciſtern of mercury, and then abſtract the air till the gage riſes to ſome determined height. The difference *e* between this height and the barometric height determines the elaſticity of the air in the receiver and in the ſuſpended veſſel. Now lower down that veſſel by the ſlip-wire till its mouth is immerſed into the mercury, and admit the air into the receiver; it will preſs the mercury into the little veſſel. Lower it ſtill farther down, till the mercury within it is level with that without; then ſtop its mouth, take it out and weigh the mercury, and let its weight be *w*. Subtract this weight from the weight *v* of the mercury, which would completely fill the whole veſſel; then the natural bulk of the air will be *v*—*w*, while its bulk, when of the elaſticity *e* in the rarefied receiver, was the bulk or capacity *w* of the veſſel. Its denſity therefore, correſponding to this elaſticity *e*, was $\frac{v-w}{w}$. And thus may the relation between the denſity and elaſticity in all caſes be obtained.

Boylean Law.

211 Various experiments have been made to this purpoſe.

A great variety of experiments to this purpoſe have been made, with different degrees of attention, according to the intereſt which the philoſophers had in the reſult. Thoſe made by M. de Luc, General Roy, Mr Trembley, and Sir George Shuckburgh, are by far the moſt accurate; but they are all confined to very moderate rarefactions. The general reſult has been, that the elaſticity of rarefied air is very nearly proportional to its denſity. We cannot ſay with confidence that any regular deviation from this law has been obſerved, there being as many obſervations on one ſide as on the other; but we think that it is not unworthy the attention of philoſophers to determine it with preciſion in the caſes of extreme rarefaction, where the irregularities are moſt remarkable. The great ſource of error is a certain adheſive ſluggiſhneſs of the mercury when the impelling forces are very ſmall; and other fluids can hardly be uſed, becauſe they either ſmear the inſide of the tube and diminiſh its capacity, or they are converted into vapour, which alters the law of elaſticity.

212 The Boylean law may in general be aſſumed.

Let us, upon the whole, aſſume the Boylean law, *viz.* that the elaſticity of the air is proportional to its denſity. The law deviates not in any ſenſible degree from the truth in thoſe caſes which are of the greateſt practical importance, that is, when the denſity does not much exceed or fall ſhort of that of ordinary air.

213 Inveſtigation of the [illegible] particles on each other.

Let us now ſee what information this gives us with reſpect to the action of the particles on each other.

The inveſtigation is extremely eaſy. We have ſeen that a force eight times greater than the preſſure of the atmoſphere will compreſs common air into the eighth part of its common bulk, and give it eight times its common denſity: and in this caſe we know, that the particles are at half their former diſtance, and that the number which are now acting on the ſurface of the piſton employed to compreſs them is quadruple of the number which act on it when it is of the common denſity. Therefore, when this eightfold compreſſing force is diſtributed over a fourfold number of particles, the portion of it which acts on each is double. In like manner, when a compreſſing force 27 is employed, the air is compreſſed into $\frac{1}{27}$ of its former bulk, the particles are at $\frac{1}{3}$ of their former diſtance, and the force is diſtributed among 9 times the number of particles; the force on each is therefore 3. In ſhort, let $\frac{1}{x}$ be the diſtance of the particles, the number of them in any given veſſel, and therefore the denſity will be as x^3, and the number preſſing by their elaſticity on its whole internal ſurface will be as x^2. Experiment ſhows, that the compreſſing force is as x^3, which being diſtributed over the number as x^2, will give the force on each as x. Now this force is in immediate equilibrium with the elaſticity of the particle immediately contiguous to the compreſſing ſurface. This elaſticity is therefore as x: and it follows from the nature of perfect fluidity, that the particle adjoining to the compreſſing ſurface preſſes with an equal force on its adjoining particles on every ſide. Hence we muſt conclude, that the corpuſcular repulſions exerted by the adjoining particles are inverſely as their diſtances from each other, or that the adjoining particles tend to recede from each other with forces inverſely proportional to their diſtances.

214 Sir Iſaac Newton was the firſt who reaſoned properly on this ſubject.

Sir Iſaac Newton was the firſt who reaſoned in this manner from the phenomena. Indeed he was the firſt who had the patience to reflect on the phenomena with any preciſion. His diſcoveries in gravitation naturally

Boylean Law. gave his thoughts this turn, and he very early hinted his ſuſpicions that all the characteriſtic phenomena of tangible matter were produced by forces which were exerted by the particles at ſmall and inſenſible diſtances: And he conſiders the phenomena of air as affording an excellent example of this inveſtigation, and deduces from them the law which we have now demonſtrated; and ſays, that air conſiſts of particles which avoid the adjoining particles with forces inverſely proportional to their diſtances from each other. From this he deduces (in the 2d book of his Principles) ſeveral beautiful propoſitions, determining the mechanical conſtitution of the atmoſphere.

215 Limits the action to adjoining particles. But it muſt be noticed that he limits this action to the *adjoining* particles: and this is a remark of immenſe conſequence, though not attended to by the numerous experimenters who adopt the law.

It is plain that the particles are ſuppoſed to act at a diſtance, and that this diſtance is variable, and that the forces diminiſh as the diſtances increaſe. A very ordinary air-pump will rarefy the air 125 times. The diſtance of the particles is now 5 times greater than before; and yet they ſtill repel each other: for air of this denſity will ſtill ſupport the mercury in a ſyphon-gage at the height of 0.24, or $\frac{24}{100}$ of an inch; and a better pump will allow this air to expand twice as much, and ſtill leave it elaſtic. Thus we ſee that whatever is the diſtance of the particles of common air, they can act five times farther off. The queſtion comes now to be, Whether, in the ſtate of common air, they really do act five times farther than the diſtance of the adjoining particles? While the particle *a* acts on the particle *b* with the force 5, does it alſo act on the particle *c* with the force 2.5, on the particle *d* with the force 1.667, on the particle *e* with the force 1.25, on the particle *f* with the force 1, on the particle *g* with the force 0.8333, &c.?

216 Sir Iſaac Newton ſhows in the plaineſt manner, that this is by no means the caſe; for if this were the caſe, he makes it appear that the ſenſible phenomena of condenſation would be totally different from what we obſerve. The force neceſſary for a quadruple condenſation would be eight times greater, and for a nonuple condenſation the force muſt be 27 times greater. Two ſpheres filled with condenſed air muſt repel each other, and two ſpheres containing air that is rarer than the ſurrounding air muſt attract each other, &c. &c. All this will appear very clearly, by applying to air the reaſoning which Sir Iſaac Newton has employed in deducing the ſenſible law of mutual tendency of two ſpheres, which conſiſt of particles attracting each other with forces proportional to the ſquare of the diſtance inverſely.

217 If we could ſuppoſe that the particles of air repelled each other with invariable forces at all diſtances within ſome ſmall and inſenſible limit, this would produce a compreſſibility and elaſticity ſimilar to what we obſerve. For if we conſider a row of particles, within this limit, as compreſſed by an external force applied to the two extremities, the action of the whole row on the extreme points would be proportional to the number of particles, that is, to their diſtance inverſely and to their denſity: and a number of ſuch parcels, ranged in a ſtraight line, would conſtitute a row of any ſenſible magnitude having the ſame law of compreſſion. But this law of corpuſcular force is unlike every thing we obſerve in nature, and to the laſt degree improbable. Height of the Atmoſphere.

218 We muſt therefore continue the limitation of this mutual repulſion of the particles of air, and be contented for the preſent with having aſcertained it as an experimental fact, that the *adjoining particles* of air are kept aſunder by forces inverſely proportional to their diſtances: or perhaps it is better to abide by the ſenſible law, that *the denſity of air is proportional to the compreſſing force*. This law is abundantly ſufficient for explaining all the ſubordinate phenomena, and for giving us a complete knowledge of the mechanical conſtitution of our atmoſphere.

219 The height of the air inveſtigated from conſidering its compreſſibility, &c. And in the firſt place, this view of the compreſſibility of the air muſt give us a very different notion of the height of the atmoſphere from what we deduced on a former occaſion from our experiments. It is found, that when the air is of the temperature 32° of Fahrenheit's thermometer, and the mercury in the barometer ſtands at 30 inches, it will deſcend one-tenth of an inch if we take it to a place 87 feet higher. Therefore, if the air were equally denſe and heavy throughout, the height of the atmoſphere would be $30 \times 10 \times 87$ feet, or 5 miles and 100 yards. But the looſe reaſoning adduced on that occaſion was enough to ſhow us that it muſt be much higher; becauſe every ſtratum as we aſcend muſt be ſucceſſively rarer as it is leſs compreſſed by incumbent weight. Not knowing to what degree air expanded when the compreſſion was diminiſhed, we could not tell the ſucceſſive diminutions of denſity and conſequent augmentation of bulk and height; we could only ſay, that ſeveral atmoſpheric appearances indicated a much greater height. Clouds have been ſeen much higher; but the phenomenon of the twilight is the moſt convincing proof of this. There is no doubt that the viſibility of the ſky or air is owing to its want of perfect tranſparency, each particle (whether of matter purely aerial or heterogeneous) reflecting a little light.

220 Fig. 71. Let *b* (fig. 71.) be the laſt particle of illuminated air which can be ſeen in the horizon by a ſpectator at A. This muſt be illuminated by a ray SD *b*, touching the earth's ſurface at ſome point D. Now it is a known fact, that the degree of illumination called *twilight* is perceived when the ſun is 18° below the horizon of the ſpectator, that is, when the angle E *b* S or ACD is 18 degrees; therefore *b* C is the ſecant of 9 degrees (it is leſs, viz. about $8\frac{1}{2}$ degrees, on account of refraction). We know the earth's radius to be about 3970 miles: hence we conclude *b* B to be about 45 miles; nay, a very ſenſible illumination is perceptible much farther from the ſun's place than this, perhaps twice as far, and the air is ſufficiently denſe for reflecting a ſenſible light at the height of nearly 200 miles.

221 Experiment fixes no limit to the air's expanſibility. We have now ſeen that air is prodigiouſly expanſible. None of our experiments have diſtinctly ſhown us any limit. But it does not follow that it is expanſible without end; nor is this at all likely. It is much more probable that there is a certain diſtance of the parts in which they no longer repel each other; and this would be the diſtance at which they would arrange themſelves if they were not heavy. But at the very ſummit of the atmoſphere they will be a very ſmall matter nearer to each other, on account of their gravitation to the earth.

Till we know preciſely the law of this mutual repulſion, we cannot ſay what is the height of the atmoſphere.

222 Farther obſervations on, and inveſtigation of, the height of the atmoſphere.

But if the air be an elaſtic fluid whoſe denſity is always proportionable to the compreſſing force, we can tell what is its denſity at any height above the ſurface of the earth: and we can compare the denſity ſo calculated with the denſity diſcovered by obſervation: for this laſt is meaſured by the height at which it ſupports mercury in the barometer. This is the direct meaſure of the preſſure of the external air; and as we know the law of gravitation, we can tell what would be the preſſure of air having the calculated denſity in all its parts.

223 Let us therefore ſuppoſe a priſmatic or cylindric column of air reaching to the top of the atmoſphere. Let this be divided into an indefinite number of ſtrata of very ſmall and equal depths or thickneſs; and let us, for greater ſimplicity, ſuppoſe at firſt that a particle of air is of the ſame weight at all diſtances from the centre of the earth.

224 The abſolute weight of any one of theſe ſtrata will on theſe conditions be proportional to the number of particles or the gravity of air contained in it; and ſince the depth of each ſtratum is the ſame, this quantity of air will evidently be as the denſity of the ſtratum: but the denſity of any ſtratum is as the compreſſing force; that is, as the preſſure of the ſtrata above it; that is, as their weight; that is, as their quantity of matter—therefore the quantity of air in each ſtratum is proportional to the quantity of air above it; but the quantity in each ſtratum is the difference between the column incumbent on its bottom and on its top: theſe differences are therefore proportional to the quantities of which they are the differences. But when there is a ſeries of quantities which are proportional to their own differences, both the quantities and their differences are in continual or geometrical progreſſion: for let *a*, *b*, *c*, be three ſuch quantities that

$b : c = a - b : b - c$, then by alter.

$b : a - b = c : b - c$ and by compoſ.

$b : a = c : b$

and $a : b = b : c$

therefore the denſities of theſe ſtrata decreaſe in a geometrical progreſſion; that is, when the elevations above the centre or ſurface of the earth increaſe, or their depths under the top of the atmoſphere decreaſe, in an arithmetical progreſſion, the denſities decreaſe in a geometrical progreſſion.

225 Fig. 72. Let ARQ (fig. 72.) repreſent the ſection of the earth by a plane through its centre O, and let *m*OAM be a vertical line, and AE perpendicular to OA will be a horizontal line through A, a point on the earth's ſurface. Let AE be taken to repreſent the denſity of the air at A; and let DH, parallel to AE, be taken to AE as the denſity at D is to the denſity at A: it is evident, that if a logiſtic or logarithmic curve EHN be drawn, having AN for its axis, and paſſing through the points E and H, the denſity of the air at any other point C, in this vertical line, will be repreſented by CG, the ordinate to the curve in that point: for it is the property of this curve, that if portions AB, AC, AD, of its axis be taken in arithmetical progreſſion, the ordinates, AE, BF, CG, DH, will be in geometrical progreſſion.

226 It is another fundamental property of this curve, that if EK or HS touch the curve in E or H, the ſubtangent AK or DS is a conſtant quantity.

227 And a third fundamental property is, that the infinitely extended area MAEN is equal to the rectangle KAEL of the ordinate and ſubtangent; and, in like manner, the area MDHN is equal to SD × DH, or to KA × DH: conſequently the area lying beyond any ordinate is proportional to that ordinate.

228 Theſe geometrical properties of this curve are all analogous to the chief circumſtances in the conſtitution of the atmoſphere, on the ſuppoſition of equal gravity. The area MCGN repreſents the whole quantity of aereal matter which is above C: for CG is the denſity at C, and CD is the thickneſs of the ſtratum between C and D; and therefore CGHD will be as the quantity of matter or air in it; and in like manner of all the others, and of their ſums, or the whole area MCGN: and as each ordinate is proportional to the area above it, ſo each denſity, and the quantity of air in each ſtratum, is proportional to the quantity of air above it: and as the whole area MAEN is equal to the rectangle KAEL, ſo the whole air of variable denſity above A might be contained in a column KA, if, inſtead of being compreſſed by its own weight, it were without weight, and compreſſed by an external force equal to the preſſure of the air at the ſurface of the earth. In this caſe, it would be of the uniform denſity AE, which it has at the ſurface of the earth, making what we have repeatedly called the homogeneous atmoſphere.

229 Hence we derive this important circumſtance, that the height of the homogeneous atmoſphere is the ſubtangent of that curve whoſe ordinates are as the denſities of the air at different heights, on the ſuppoſition of equal gravity. This curve may with propriety be called the ATMOSPHERICAL LOGARITHMIC: and as the different logarithmics are all characteriſed by their ſubtangents, it is of importance to determine this one.

It may be done by comparing the denſities of mercury and air. For a column of air of uniform denſity, reaching to the top of the homogeneous atmoſphere, is in equilibrio with the mercury in the barometer. Now it is found, by the beſt experiments, that when mercury and air are of the temperature 32° of Fahrenheit's thermometer, and the barometer ſtands at 30 inches, the mercury is nearly 10440 times denſer than air. Therefore the height of the homogeneous atmoſphere is 10440 times 30 inches, or 26100 feet, or 8700 yards, or 4350 fathoms, or 5 miles wanting 100 yards.

230 Or it may be found by obſervations on the barometer. It is found, that when the mercury and air are of the above temperature, and the barometer on the ſea-ſhore ſtands at 30 inches, if we carry it to a place 884 feet higher it will fall to 29 inches. Now, in all logarithmic curves having equal ordinates, the portions of the axes intercepted between the correſponding pairs of ordinates are proportional to the ſubtangents. And the ſubtangents of the curve belonging to our common tables is 0.4342945, and the difference of the logarithms of 30 and 29 (which is the portion of the axis intercepted between the ordinates 30 and 29), or 0.0147233, is to 0.4342945 as 884 is to 26058 feet, or 8686 yards, or 4343 fathoms, or 5 miles wanting 114 yards. This determination is 14 yards leſs than the other, and it is uncertain which is the more exact. It is extremely [illegible]

Height of the Atmosphere.

to meaſure the reſpective denſities of mercury and air; and in meaſuring the elevation which produces a fall of one inch in the barometer, an error of $\frac{1}{20}$ of an inch would produce all the difference. We prefer the laſt, as depending on fewer circumſtances.

231 But all this inveſtigation proceeds on the ſuppoſition of equal gravity, whereas we know that the weight of a particle of air decreaſes as the ſquare of its diſtance from the centre of the earth increaſes. In order, therefore, that a ſuperior ſtratum may produce an equal preſſure at the ſurface of the earth, it muſt be denſer, becauſe a particle of it gravitates leſs. The denſity, therefore, at equal elevations, muſt be greater than on the ſuppoſition of equal gravity, and the law of diminution of denſity muſt be different.

$$\begin{aligned}\text{Make }\ \mathrm{OD}:\mathrm{OA}&=\mathrm{OA}:\mathrm{O}d;\\ \mathrm{OC}:\mathrm{OA}&=\mathrm{OA}:\mathrm{O}c;\\ \mathrm{OB}:\mathrm{OA}&=\mathrm{OA}:\mathrm{O}b;\ \&\text{c.};\end{aligned}$$

ſo that O*d*, O*c*, O*b*, OA, may be reciprocals to OD, OC, OB, OA; and through the points A, *b*, *c*, *d*, draw the perpendiculars AE, *bf*, *cg*, *dh*, making them proportional to the denſities in A, B, C, D: and let us ſuppoſe CD to be exceedingly ſmall, ſo that the denſity may be ſuppoſed uniform through the whole ſtratum. Thus we have

$$\begin{aligned}&\mathrm{OD}\times\mathrm{O}d=\mathrm{OA}^2,=\mathrm{OC}\times\mathrm{O}c\\ \text{and}\quad&\mathrm{O}c:\mathrm{O}d=\mathrm{OD}:\mathrm{OC};\\ \text{and}\quad&\mathrm{O}c:\mathrm{O}c-\mathrm{O}d=\mathrm{OD}:\mathrm{OD}-\mathrm{OC},\\ \text{or}\quad&\mathrm{O}c:cd=\mathrm{OD}:\mathrm{DC};\\ \text{and}\quad&cd:\mathrm{CD}=\mathrm{O}c:\mathrm{OD};\end{aligned}$$

or, becauſe OC and OD are ultimately in the ratio of equality, we have

$$cd:\mathrm{CD}=\mathrm{O}c:\mathrm{OC}=\mathrm{OA}^2:\mathrm{OC}^2,$$

and $cd=\mathrm{CD}\times\frac{\mathrm{OA}^2}{\mathrm{OC}^2}$, and $cd\times cg=\mathrm{CD}\times cg\times\frac{\mathrm{OA}^2}{\mathrm{OC}^2}$;

but $\mathrm{CD}\times cg\times\frac{\mathrm{OA}^2}{\mathrm{OC}^2}$ is as the preſſure at C ariſing from the abſolute weight of the ſtratum CD. For this weight is as the bulk, as the denſity, and as the gravitation of each particle jointly. Now CD expreſſes the bulk, *cg* the denſity, and $\frac{\mathrm{OA}^2}{\mathrm{OC}^2}$ the gravitation of each particle. Therefore, $cd\times cg$ is as the preſſure on C ariſing from the weight of the ſtratum DC; but $cd\times cg$ is evidently the element of the curvilineal area A*mn*E, formed by the curve E*f g h n* and the ordinates AE, *bf*, *cg*, *ah*, &c. *mn*. Therefore the ſum of all the elements, ſuch as *c d h g*, that is, the area *c m n g* below *cg*, will be as the *whole* preſſure on C, ariſing from the gravitation of all the air above it; but, by the nature of air, this whole preſſure is as the denſity which it produces, that is, as *c g*. Therefore the curve E*g n* is of ſuch a nature that the area lying below or beyond any ordinate *cg* is proportional to that ordinate. This is the property of the logarithmic curve, and E*g n* is a logarithmic curve.

232 But farther, this curve is the ſame with EGN. For let B continually approach to A, and ultimately coincide with it. It is evident that the ultimate ratio of BA to A*b*, and of BF to *bf*, is that of equality; and if EFK, E*fk*, be drawn, they will contain equal angles with the ordinate AE, and will cut off equal ſubtangents AK, A*k*. The curves EGN, E*gn* are therefore the ſame, but in oppoſite poſitions.

233 Laſtly, if OA, O*b*, O*c* O*d*, &c. be taken in arithmetical progreſſion decreaſing, their reciprocals OA, OB, OC, OD, &c. will be in harmonical progreſſion increaſing, as is well known: but, from the nature of the logarithmic curve, when OA, O*b*, O*c*, O*d*, &c. are in arithmetical progreſſion, the ordinates AE, *bf*, *cg*, *dh*, &c. are in geometrical progreſſion. Therefore when OA, OB, OC, OD, &c. are in harmonical progreſſion, the denſities of the air at A, B, C, D, &c. are in geometrical progreſſion; and thus may the denſity of the air at all elevations be diſcovered. Thus to find the denſity of the air at K the top of the homogeneous atmoſphere, make OK : OA=OA : OL, and draw the ordinate LT, LT is the denſity at K.

The celebrated Dr Halley was the firſt who obſerved the relation between the denſity of the air and the ordinates of the logarithmic curve, or common logarithms. This he did on the ſuppoſition of equal gravity; and his diſcovery is acknowledged by Sir Iſaac Newton in *Princip.* ii. *prop.* 22. *ſchol.* Halley's diſſertation on the ſubject is in N° 185 of the Phil. Tranſ. Newton, with his uſual ſagacity, extended the ſame relation to the true ſtate of the caſe, where gravity is as the ſquare of the diſtance inverſely; and ſhowed that when the diſtances from the earth's centre are in harmonic progreſſion, the denſities are in geometric progreſſion. He ſhows indeed, in general, what progreſſion of the diſtance, on any ſuppoſition of gravity, will produce a geometrical progreſſion of the denſities, ſo as to obtain a ſet of lines OA, O*b*, O*c*, O*d*, &c. which will be logarithms of the denſities. The ſubject was afterwards treated in a more familiar manner by Cotes in his *Hydroſt. Lect.* and in his *Harmonia Menſurarum*; alſo by Dr Brook Taylor, *Meth. Increment.*; Wolf in his *Aerometria*; Herman in his *Phoronomia*; &c. &c. and lately by Horſley, Phil. Tranſ. tom. lxiv.

234 The air has a finite denſity at an infinite diſtance from the centre of the earth.

An important corollary is deducible from theſe principles, viz. that the air has a finite denſity at an infinite diſtance from the centre of the earth, namely, ſuch as will be repreſented by the ordinate OP drawn through the centre. It may be objected to this concluſion, that it would infer an infinity of matter in the univerſe, and that it is inconſiſtent with the phenomena of the planetary motions, which appear to be performed in a ſpace void of all reſiſtance, and therefore of all matter. But this fluid muſt be ſo rare at great diſtances, that the reſiſtance will be inſenſible, even though the retardation occaſioned by it has been accumulated for ages. Even at the very moderate diſtance of 500 miles, the rarity is ſo great that a cubic inch of common air expanded to that degree would occupy a ſphere equal to the orbit of Saturn; and the whole retardation which this planet would ſuſtain after ſome millions of years would not exceed what would be occaſioned by its meeting one bit of matter of half a grain weight.

This being the caſe, it is not unreaſonable to ſuppoſe the viſible univerſe occupied by air, which, by its gravitation, will accumulate itſelf round every body in it, in a proportion depending on their quantities of matter, the larger bodies attracting more of it than the ſmaller ones, and thus forming an atmoſphere about each. And many appearances warrant this ſuppoſition. Jupiter, Mars, Saturn, and Venus, are evidently ſurrounded by atmoſpheres. The conſtitution of theſe atmoſpheres may differ exceedingly from other cauſes. If the planet

Atmoſpheres of the other Planets, &c.

net has nothing on its ſurface which can be diſſolved by the air or volatilized by heat, the atmoſphere will be continually clear and tranſparent, like that of the moon.

235 The atmoſphere of Mars.

Mars has an atmoſphere which appears preciſely like our own, carrying clouds, or depoſiting ſnows: for when, by the obliquity of his axis to the plane of his ecliptic, he turns his north pole towards the ſun, it is obſerved to be occupied by a broad white ſpot. As the ſummer of that region advances, this ſpot gradually waſtes, and ſometimes vaniſhes, and then the ſouth pole comes in ſight, ſurrounded in like manner with a white ſpot, which undergoes ſimilar changes. This is preciſely the appearance which the ſnowy circumpolar regions of this earth will exhibit to an aſtronomer on Mars. It may not, however, be ſnow that we ſee; thick clouds will have the ſame appearances.

236 Of Jupiter.

The atmoſphere of the planet Jupiter is alſo very ſimilar to our own. It is diverſified by ſtreaks or belts parallel to his equator, which frequently change their appearance and dimenſions, in the ſame manner as thoſe tracks of ſimilar ſky which belong to different regions of this globe. There is a certain kind of weather that more properly belongs to a particular climate than to any other. This is nothing but a certain general ſtate of the atmoſphere which is prevalent there, though with conſiderable variations. This muſt appear to a ſpectator in the moon like a ſtreak ſpread over that climate, diſtinguiſhing it from others. But the moſt remarkable ſimilarity is in the motion of the clouds on Jupiter. They have plainly a motion from eaſt to weſt relative to the body of the planet: for there is a remarkable ſpot on the ſurface of the planet, which is obſerved to turn round the axis in 9h. 51′ 16″; and there frequently appear variable and periſhing ſpots in the belts, which ſometimes laſt for ſeveral revolutions. Theſe are obſerved to circulate in 9. 55. 05. Theſe numbers are the reſults of a long ſeries of obſervations by Dr Herſchel. This plainly indicates a general current of the clouds weſtward, preciſely ſimilar to what a ſpectator in the moon muſt obſerve in our atmoſphere ariſing from the trade-winds. Mr Schroeter has made the atmoſphere of Jupiter a ſtudy for many years; and deduces from his obſervations that the motion of the variable ſpots is ſubject to great variations, but is always from eaſt to weſt. This indicates variable winds.

237 Of Venus.

The atmoſphere of Venus appears alſo to be like ours, loaded with vapours, and in a ſtate of continual change of abſorption and precipitation. About the middle of the 17th century the ſurface of Venus was pretty diſtinctly ſeen for many years chequered with irregular ſpots, which are deſcribed by Campani, Bianchini, and other aſtronomers in the ſouth of Europe, and alſo by Caſſini at Paris, and Hooke and Townley in England. But the ſpots became gradually more faint and indiſtinct; and, for near a century, have diſappeared. The whole ſurface appears now of one uniform brilliant white. The atmoſphere is probably filled with a reflecting vapour, thinly diffuſed through it, like water faintly tinged with milk. A great depth of this muſt appear as white as a ſmall depth of milk itſelf; and it appears to be of a *very great* depth, and to be refractive like our air. For Dr Herſchel has obſerved, by the help of his fine teleſcopes, that the illuminated part of Venus is conſiderably more than a hemiſphere, and that the light dies gradually away to the bounding margin. This is the very appearance that the earth would make if furniſhed with ſuch an atmoſphere. The boundary of illumination would have a penumbra reaching about nine degrees beyond it. If this be the conſtitution of the atmoſphere of Venus, ſhe may be inhabited by beings like ourſelves. They would not be dazzled by the intolerable ſplendor of a ſun four times as big and as bright, and ſixteen times more glaring, than ours: for they would ſeldom or never ſee him, but inſtead of him an uniformly bright and white ſky. They would probably never ſee a ſtar or planet, unleſs the dog-ſtar and Mercury; and perhaps the earth might pierce through the bright haze which ſurrounds their planet. For the ſame reaſon the inhabitants would not perhaps be incommoded by the ſun's heat. It is indeed a very queſtionable thing, whether the ſun would cauſe any heat, even here, if it were not for the chemical action of his rays on our air. This is rendered not improbable by the intenſe cold felt on the tops of the higheſt mountains, in the cleareſt air, and even under a vertical ſun in the torrid zone.

238 And of comets.

The atmoſphere of comets ſeems of a nature totally different. This ſeems to be of inconceivable rarity, even when it reflects a very ſenſible light. The tail is always turned nearly away from the ſun. It is thought that this is by the impulſe of the ſolar rays. If this be the caſe, we think it might be diſcovered by the aberration and the refraction of the light by which we ſee the tail: for this light muſt come to our eye with a much ſmaller velocity than the ſun's light, if it be reflected by repulſive or elaſtic forces, which there is every reaſon in the world to believe; and therefore the velocity of the reflected light will be diminiſhed by all the velocity communicated to the reflecting particles. This is almoſt inconceivably great. The comet of 1680 went half round the ſun in ten hours, and had a tail at leaſt a hundred millions of miles long, which turned round at the ſame time, keeping nearly in the direction oppoſite to the ſun. The velocity neceſſary for this is prodigious, approaching to that of light. And perhaps the tail extends much farther than we ſee it, but is viſible only as far as the velocity with which its particles recede from the ſun is leſs than a certain quantity, namely, what would leave a ſufficient velocity for the reflected light to enable it to affect our eyes. And it may be demonſtrated, that although the real form of the viſible tail is concave on the anterior ſide to which the comet is moving, it may appear convex on that ſide, in conſequence of the very great aberration of the light by which the remote parts are ſeen. All this may be diſcovered by properly contrived obſervations; and the conjecture merits attention. But of this digreſſion there is enough; and we return to our ſubject, the conſtitution of our air.

239 Barometer uſed in taking heights.

We have ſhown how to determine *à priori* the denſity of the air at different elevations above the ſurface of the earth. But the denſities may be diſcovered in all acceſſible elevations by experiments; namely, by obſerving the heights of the mercury in the barometer. This is a direct meaſure of the preſſure of the incumbent atmoſphere; and this is proportional to the denſity which it produces.

240

Therefore, by means of the relation ſubſiſting between the denſities and the elevations, we can diſcover the elevations by obſervations made on the denſities by means of the barometer; and thus we may meaſure elevations by means of the barometer; and, with very little trouble, take the level of any extenſive track of country. Of this we have an illuſtrious example in the ſection which the Abbé Chappe D'Auteroche has given of the whole country between Breſt and Ekaterineburgh in Siberia. This is a ſubject which deſerves a minute conſideration: we ſhall therefore preſent it under a very ſimple and familiar form; and trace the method through its various ſteps of improvement by De Luc, Roy, Shuckburgh, &c.

241 Explanation of its uſe, &c.

We have already obſerved, oftener than once, that if the mercury in the barometer ſtands at 30 inches, and if the air and mercury be of the temperature 32° in Fahrenheit's thermometer, a column of air 87 feet thick has the ſame weight with a column of mercury $\frac{1}{10}$ of an inch thick. Therefore, if we carry the barometer to a higher place, ſo that the mercury ſinks to 29.9, we have aſcended 87 feet. Now, ſuppoſe we carry it ſtill higher, and that the mercury ſtands at 29.8; it is required to know what height we have now got to? We have evidently aſcended through another ſtratum of equal weight with the former: but it muſt be of greater thickneſs, becauſe the air in it is rarer, being leſs compreſſed. We may call the denſity of the firſt ſtratum 300, meaſuring the denſity by the number of tenths of an inch of mercury which its elaſticity proportional to its denſity enables it to ſupport. For the ſame reaſon, the denſity of the ſecond ſtratum muſt be 299: but when the weights are equal, the bulks are inverſely as the denſities; and when the baſes of the ſtrata are equal, the bulks are as the thickneſſes. Therefore, to obtain the thickneſs of this ſecond ſtratum, ſay 299 : 300=87 : 87.29; and this fourth term is the thickneſs of the ſecond ſtratum, and we have aſcended in all 174.29 feet. In like manner we may riſe till the barometer ſhows the denſity to be 298: then ſay, 208 : 30=87 : 87.584 for the thickneſs of the third ſtratum, and 261,875 or 261$\frac{7}{8}$ for the whole aſcent; and we may proceed in the ſame way for any number of mercurial heights, and make a table of the correſponding elements as follows: Where the firſt column is the height of the mercury in the barometer, the ſecond column is the thickneſs of the ſtratum, or the elevation above the preceding ſtation; and the third column is the whole elevation above the firſt ſtation.

Bar.	Strat.	Elev.
30	00.000	00.000
29.9	87.000	87.000
29.8	87.291	174.291
29.7	87.584	261.875
29.6	87.879	349.754
29.5	88.176	437.930
29.4	88.475	526.405
29.3	88.776	615.181
29.2	89.079	704.260
29.1	89.384	793.644
29	89.691	883.335

242 Having done this, we can now meaſure any elevation within the limits of our table, in this manner.

Obſerve the barometer at the lower and at the upper ſtations, and write down the correſponding elevations. Subtract the one from the other, and the remainder is the height required. Thus ſuppoſe that at the lower ſtation the mercurial height was 29.8, and that at the upper ſtation it was 29.1.

$$\begin{array}{ll} 29.1 & 793.644 \\ 29.8 & 174.291 \\ \hline & 619.353 = \text{Elevation.} \end{array}$$

We may do the ſame thing with tolerable accuracy without the table, by taking the medium *m* of the mercurial heights, and their difference *d* in tenths of an inch; and then ſay, as *m* to 300, ſo is 87*d* to the height required *h*: or $h=\frac{300\times 87d}{m}=\frac{26100d}{m}$. Thus, in the foregoing example, *m* is 294.5, and *d* is =7; and therefore $h=\frac{7\times 26100}{294.5}=620.4$, differing only one foot from the former value.

Either of theſe methods is ſufficiently accurate for moſt purpoſes, and even in very great elevations will not produce any error of conſequence: the whole error of the elevation 883 feet 4 inches, which is the extent of the above table, is only $\frac{1}{4}$ of an inch.

243 But we need not confine ourſelves to methods of approximation, when we have an accurate and ſcientific method that is equally eaſy. We have ſeen that, upon the ſuppoſition of equal gravity, the denſities of the air are as the ordinates of a logarithmic curve, having the line of elevations for its axis. We have alſo ſeen that, in the true theory of gravity, if the diſtances from the centre of the earth increaſe in a harmonic progreſſion, the logarithm of the denſities will decreaſe in an arithmetical progreſſion; but if the greateſt elevation above the ſurface be but a few miles, this harmonic progreſſion will hardly differ from an arithmetical one. Thus, if A*b*, A*c*, A*d*, are 1, 2, and 3 miles, we ſhall find that the correſponding elevations AB, AC, AD are ſenſibly in arithmetical progreſſion alſo; for the earth's radius AC is nearly 4000 miles. Hence it plainly follows, that BC—AB is $\frac{1}{4000\times 4001}$, or $\frac{1}{16004000}$ of a mile, or $\frac{1}{250}$ of an inch; a quantity quite inſignificant. We may therefore affirm without heſitation, that in all acceſſible places, the elevations increaſe in an arithmetical progreſſion, while the denſities decreaſe in a geometrical progreſſion. Therefore the ordinates are proportional to the numbers which are taken to meaſure the denſities, and the portions of the axis are proportional to the logarithms of theſe numbers. It follows, therefore, that we may take ſuch a ſcale for meaſuring the denſities that the logarithms of the numbers of this ſcale ſhall be the very portions of the axis; that is, of the vertical line in feet, yards, fathoms, or what meaſure we pleaſe: and we may, on the other hand, chooſe ſuch a ſcale for meaſuring our elevations, that the logarithms of our ſcale of denſities ſhall be parts of this ſcale of elevations; and we may find either of theſe ſcales ſcientifically. For it is a known property of the logarithmic curves, that when the ordinates are the ſame, the intercepted portion of the abſciſſæ are proportioned to their ſubtangents. Now we know the ſubtangent of the atmoſpherical logarithmic: it is the height of the homogeneous atmoſphere in any meaſure we pleaſe, ſuppoſe fathoms: we find this height by comparing the gravities of air and mercury, when

both are of ſome determined denſity. Thus, in the temperature of 32° of Fahrenheit's thermometer, when the barometer ſtands at 30 inches, it is known (by many experiments) that mercury is 10423.068 times heavier than air; therefore the height of the balancing column of homogeneous air will be 10423.068 times 30 inches; that is, 4342.945 Engliſh fathoms. Again, it is known that the ſubtangent of our common logarithmic tables, where 1 is the logarithm of the number 10, is 0.4342945. Therefore the number 0.4342945 is to the difference D of the logarithms of any two barometric heights as 4342.945 fathoms are to the fathoms F contained in the portion of the axis of the atmoſpherical logarithmic, which is intercepted between the ordinates equal to theſe barometrical heights; or that $0.4342945 : D = 4342.945 : F$, and $0.4342,945 : 4342.945 = D : F$; but 0.4342945 is the ten-thouſandth part of 4342.945, and therefore D is the ten-thouſandth part of F.

244 And thus it happens, by mere chance, that the logarithms of the denſities, meaſured by the inches of mercury which their elaſticity ſupports in the barometer, are juſt the ten-thouſandth part of the fathoms contained in the correſponding portions of the axis of the atmoſpherical logarithmic. Therefore, if we multiply our common logarithms by 10000, they will expreſs the fathoms of the axis of the atmoſpherical logarithmic; nothing is more eaſily done. Our logarithms contain what is called the index or characteriſtic, which is an integer and a number of decimal places. Let us juſt remove the integer-place four figures to the right hand: thus the logarithm of 60 is 1.7781513, which is one integer and $\frac{7781513}{10000000}$. Multiply this by 10.000, and we obtain $\frac{513}{1001}$ 17781.513, or 17781 $\frac{513}{1000}$.

245 The practical application of all this reaſoning is obvious and eaſy; obſerve the heights of the mercury in the barometer at the upper and lower ſtations in inches and decimals; take the logarithms of theſe, and ſubtract the one from the other: the difference between them (accounting the four firſt decimal figures as integers) is the difference of elevation of fathoms.

Example.

Merc. Height at the lower ſtation	29.8	1.4742163
upper ſtation	29.1	1.4638930
Diff. of Log. × 10000		0.0103.233

or 103 fathoms and $\frac{233}{1000}$ of a fathom, which is 619.392 feet, or 619 feet $4\frac{3}{4}$ inches; differing from the approximated value formerly found about $\frac{1}{2}$ an inch.

246 This me- hod of neaſuring neights now much mproved.

Such is the general nature of the barometric meaſurement of heights firſt ſuggeſted by Dr Halley; and it has been verified by numberleſs compariſons of the heights calculated in this way with the ſame heights meaſured geometrically. It was indeed in this way that the preciſe ſpecific gravity of air and mercury was moſt accurately determined; namely, by obſerving, that when the temperature of air and mercury was 32, the difference of the logarithms of the mercurial heights were preciſely the fathoms of elevation. But it requires many corrections to adjuſt this method to the circumſtances of the caſe; and it was not till very lately that it has been ſo far adjuſted to them as to become uſeful. We are chiefly indebted to Mr de Luc for the improvements. The great elevations in Switzerland enabled him to make an immenſe number of obſervations, in almoſt every variety of circumſtances. Sir George Shuckburgh alſo made a great number with moſt accurate inſtruments in much greater elevations, in the ſame country; and he made many chamber experiments for determining the laws of variation in the ſubordinate circumſtances. General Roy alſo made many to the ſame purpoſe. And to theſe two gentlemen we are chiefly obliged for the corrections which are now generally adopted.

[illegible]

247 It depends on the ſpecific gravity of air and mercury.

It is eaſy to perceive that the method, as already expreſſed, cannot apply to every caſe: it depends on the ſpecific gravity of air and mercury, combined with the ſuppoſition that this is affected *only by a change of preſſure*. But ſince all bodies are expanded by heat, and as there is no reaſon to ſuppoſe that they are equally expanded by it, it follows that a change of temperature will change the relative gravity of mercury and air, even although both ſuffer the ſame change of temperature: and ſince the air may be warmed or cooled when the mercury is not, or may change its temperature independent of it, we may expect ſtill greater variations of ſpecific gravity.

The general effect of an augmentation of the ſpecific gravity of the mercury muſt be to increaſe the ſubtangent of the atmoſpherical logarithmic; in which caſe the logarithms of the denſities, as meaſured by inches of mercury, will expreſs meaſures that are greater than fathoms in the ſame proportion that the ſubtangent is increaſed; or, when the air is more expanded than the mercury, it will require a greater height of homogeneous atmoſphere to balance 30 inches of mercury, and a given fall of mercury will then correſpond to a thicker ſtratum of air.

In order, therefore, to perfect this method, we muſt learn by experiment how much mercury expands by an increaſe of temperature; we muſt alſo learn how much the air expands by the ſame, or any change of temperature; and how much its elaſticity is affected by it. Both theſe circumſtances muſt be conſidered in the caſe of air; for it might happen that the elaſticity of the air is not ſo much affected by heat as its bulk is.

It will, therefore, be proper to ſtate in this place the experiments which have been made for aſcertaining theſe two expanſions.

248 General Roy's experiments on the expanſion of mercury.

The moſt accurate, and the beſt adapted experiments for aſcertaining the expanſion of mercury, are thoſe of General Roy, publiſhed in the 67th volume of the Philoſophical Tranſactions. He expoſed 30 inches of mercury, actually ſupported by the atmoſphere in a barometer, in a nice apparatus, by which it could be made of one uniform temperature through its whole length; and he noted the expanſion of it in decimals of an inch. Theſe are contained in the following table; where the firſt column expreſſes the temperature by Fahrenheit's thermometer, the ſecond column expreſſes the bulk of the mercury, and the third column the expanſion of an inch of mercury for an increaſe of one degree in the adjoining temperatures.

TABLE A.

Temp.	Bulk of ☿.	Expan. for 1°
212°	30.5117	0.0000763
202	30.4888	0.0000787
192	30.4652	0.0000810
182	30.4409	0.0000833
172	30.4159	0.0000857
162	30.3902	0.0000880
152	30.3638	0.0000903
142	30.3367	0.0000923
132	30.3090	0.0000943
122	30.2807	0.0000963
112	30.2518	0.0000983
102	30.2223	0.0001003
92	30.1922	0.0001023
82	30.1615	0.0001043
72	30.1302	0.0001063
62	30.0984	0.0001077
52	30.0661	0.0001093
42	30.0333	0.0001110
32	30.0000	0.0001127
22	29.9662	0.0001143
12	29.9319	0.0001160
2	29.8971	0.0000177
0	29.8901	

249 This table gives riſe to ſome reflections. The ſcale of the thermometer is conſtructed on the ſuppoſition that the ſucceſſive degrees of heat are meaſured by equal increments of bulk in the mercury of the thermometer. How comes it, therefore, that this is not accompanied by equal increments of bulk in the mercury of the column, but that the correſponding expanſions of this column do continually diminiſh: General Roy attributes this to the gradual detachment of elaſtic matter from the mercury by heat, which preſſes on the top of the column, and therefore ſhortens it. He applied a boiling heat to the vacuum a-top, without producing any farther depreſſion; a proof that the barometer had been carefully filled. It had indeed been boiled through its whole length. He had attempted to meaſure the mercurial expanſion in the uſual way, by filling 30 inches of the tube with boiled mercury, and expoſing it to the heat with the open end uppermoſt. But here it is evident that the expanſion of the tube, and its ſolid contents, muſt be taken into the account. The expanſion of the tube was found ſo exceedingly irregular, and ſo incapable of being determined with preciſion for the tubes which were to be employed, that he was obliged to have recourſe to the method with the real barometer. In this no regard was neceſſary to any circumſtance but the perpendicular height. There was, beſides, a propriety in examining the mercury in the very condition in which it was uſed for meaſuring the preſſure of the atmoſphere; becauſe whatever complication there was in the reſults, it was the ſame in the barometer in actual uſe.

250 The moſt obvious manner of applying theſe experiments on the expanſion of mercury to our purpoſe, is to reduce the obſerved height of the mercury to what it would have been if it were of the temperature 32. Thus, ſuppoſe that the obſerved mercurial height is 29.2, and that the temperature of the mercury is 72°, make 30.1302 : 30=29.2 : 29.0738. This will be the true meaſure of the denſity of the air of the ſtandard temperature. In order that we may obtain the exact temperature of the mercury, it is proper that the obſervation be made by means of a thermometer attached to the barometer-frame, ſo as to warm and cool along with it.

251 Or, this may be done without the help of a table, and with ſufficient accuracy, from the circumſtance that the expanſion of an inch of mercury for one degree diminiſhes very nearly $\frac{1}{500}$th part in each ſucceeding degree. If therefore we take from the expanſion at 32° its thouſandth part for each degree of any range above it, we obtain a mean rate of expanſion for that range. If the obſerved temperature of the mercury is below 32°, we muſt *add* this correction to obtain the mean expanſion. This rule will be made more exact if we ſuppoſe the expanſion at 32° to be =0.0001127. Then multiply the obſerved mercurial height by this expanſion, and we obtain the correction, to be ſubtracted or added according as the temperature of the mercury was above or below 32°. Thus to abide by the former example of 72°. This exceeds 32° by 40: therefore take 40 from 0.0001127, and we have 0.0001087 for the medium expanſion for that range. Multiply this by 40, and we have the whole expanſion of one inch of mercury, =0.004348. Multiply the inches of mercurial height, viz. 29.2 by this expanſion, and we have for the correction 0.12696; which being ſubtracted from the obſerved height leaves 29.07304, differing from the accurate quantity leſs than the thouſandth part of an inch. This rule is very eaſily kept in the memory, and ſuperſedes the uſe of a table.

252 This correction may be made with all neceſſary exactneſs by a rule ſtill more ſimple; namely, by multiplying the obſerved height of the mercury by the difference of its temperature from 32°, and cutting off four cyphers before the decimals of the mercurial height. This will ſeldom err $\frac{1}{100}$ of an inch. We even believe that it is the moſt exact method within the range of temperatures that can be expected to occur in meaſuring heights: for it appears, by comparing many experiments and obſervations, that General Roy's meaſure of the mercurial expanſion is too great, and that the expanſion of an inch of mercury between 20° and 70° of Fahrenheit's thermometer does not exceed 0.000102 per degree. Having thus corrected the obſerved mercurial heights by reducing them to what they would have been if the mercury had been of the ſtandard temperature, the logarithms of the corrected heights are taken, and their difference, multiplied by 10000, will give the difference of elevations in Engliſh fathoms.

253 There is another way of applying this correction, fully more expeditious and equally accurate. The difference of the logarithms of the mercurial heights is the meaſure of the ratio of thoſe heights. In like manner the difference of the logarithms of the obſerved and corrected heights at any ſtation is the meaſure of the ratio of thoſe heights. Therefore this laſt difference of the logarithms is the meaſure of the correction of this ratio. Now the obſerved height is to the corrected height nearly as 1 to 1.000102. The logarithm of this ratio, or the difference of the logarithms of 1 and 1.000102, is 0.0000444. This is the correction for each degree that

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that the temperature of the mercury differs from 32. Therefore multiply 0.0000444 by the difference of the mercurial temperatures from 32, and the products will be the corrections of the respective logarithms.

254 But there is ſtill an eaſier way of applying the logarithmic correction. If both the mercurial temperatures are the ſame, the differences of their logarithms will be the ſame, although each may be a good deal above or below the ſtandard temperature, if the expanſion be very nearly equable. The correction will be neceſſary only when the temperatures at the two ſtations are different, and will be proportional to this difference. Therefore, if the difference of the mercurial temperatures be multiplied by 0.0000444, the product will be the correction to be made on the difference of the logarithms of the mercurial heights.

But farther, ſince the differences of the logarithms of the mercurial heights are alſo the differences of elevation in Engliſh fathoms, it follows that the correction is alſo a difference of elevation in Engliſh fathoms, or that the correction for one degree of difference of mercurial temperature is $\frac{444}{1000}$ of a fathom, or 32 inches, or 2 feet 8 inches.

This correction of 2.8 for every degree of difference of temperature muſt be ſubtracted from the elevation found by the general rate, when the mercury at the upper ſtation is colder than that at the lower. For when this is the caſe, the mercurial column at the upper ſtation will appear too ſhort, the preſſure of the atmoſphere too ſmall, and therefore the elevation in the atmoſphere will appear greater than it really is.

255 Therefore the rule for this correction will be to multiply 0.0000444 by the degrees of difference between the mercurial temperatures at the two ſtations, and to add or ſubtract the product from the elevation found by the general rule, according as the mercury at the upper ſtation is hotter or colder than at the lower.

256 If the experiments of General Roy on the expanſion of the mercury in a real barometer be thought moſt deſerving of attention, and the expanſion be conſidered as variable, the logarithmic difference correſponding to this expanſion for the *mean* temperature of the two barometers may be taken. Theſe logarithmic differences are contained in the following table, which is carried as far as 112°, beyond which it is not probable that any obſervations will be made. The number for each temperature is the difference between the logarithms of 30 inches of the temperature 32, and of 30 inches expanded by that temperature.

TABLE B.

Temp.	Log. diff.	Dec. of Fath.	Ft. In.
112°			
	0.0000427	.427	2.7
102			
	0.0000436	.436	2.7
92			
	0.0000444	.444	2.8
82			
	0.0000453	.453	2.9
72			
	0.0000460	.460	2.9
62			
	0.0000468	.468	2.10
52			
	0.0000475	.475	2.10
42			
	0.0000482	.482	2.11
32			
	0.0000489	.489	2.11
22			
	0.0000497	.497	3.0
12			
	0.0000504	.504	3.0
2			

[illegible]

It is alſo neceſſary to attend to the temperature of the air; and the change that is produced by heat in its denſity is of much greater conſequence than that of the mercury. The relative gravity of the two, on which the ſubtangent of the logarithmic curve depends, and which is conſequently the unit of our ſcale of elevations, is much more affected by the heat of the air than by the heat of the mercury.

This adjuſtment is of incomparably greater difficulty than the former, and we can hardly hope to make it perfect. We ſhall narrate the chief experiments which have been made on the expanſion of air, and deduce from them ſuch rules as appear to be moſt fit for correction of them, and then notice the circumſtances which leave the matter ſtill imperfect.

258 General Roy conſtructed a mercurial and an air thermometer, each of which was graduated arithmetically; that is, the units of the ſcales were equal bulks of mercury, and equal bulks (perhaps different from the former) of air. He found their progreſs as in the following table.

TABLE C.

Merc.	Dif.	Air.	Dif.
212		212.0	
	20		17.6
192		194.4	
	20		18.2
172		176.2	
	20		18.8
152		157.4	
	20		19.4
132		138.0	
	20		20.0
112		118.0	
	20		20.8
92		97.2	
	20		21.6
72		75.6	
	20		22.6
52		53.0	
	20		21.6
32		31.4	
	20		20.0
12		11.4	

259 It has been eſtabliſhed by many experiments that equal increments of heat produce equal increments in the bulk of mercury. The differences of temperature are therefore expreſſed by the ſecond column, and may be conſidered as equal; and the numbers of the third column muſt be allowed to expreſs the ſame temperatures with thoſe of the firſt. They *directly* expreſs the *bulks* of the air, and the numbers of the fourth column expreſs the differences of theſe bulks. Theſe are evidently unequal, and ſhow that common air expands moſt of all when of the temperature 62 nearly.

260 To deter- [illegible] a known [illegible]

The next point was to determine what was the *actual* increaſe of bulk by ſome known increaſe of heat. For this purpoſe he took a tube, having a narrow bore, and a ball at one end. He meaſured with great care the capacity of both the ball and the tube, and divided the tube into equal ſpaces which bore a determined proportion to the capacity of the ball. This apparatus was ſet in a long cylinder filled with frigorific mixtures or with water, which could be uniformly heated up to the boiling temperature, and was accompanied by a fine thermometer. The expanſion of the air was meaſured by means of a column of mercury which roſe or ſank in the tube. The tube being of a ſmall bore, the mercury did not drop out of it; and the bore being made as equable as poſſible, this column remained of an uniform length, whatever part of the tube it chanced to occupy. By this contrivance he was able to examine

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the expanſibility of air of various denſities. When the column of mercury contained only a ſingle drop or two, the air was nearly of the denſity of the external air. If he wiſhed to examine the expanſion of air twice or thrice as denſe, he uſed a column of 30 or 60 inches long; and to examine the expanſion of air that is rarer than the external air, he placed the tube with the ball uppermoſt, the open end coming through a hole in the bottom of the veſſel containing the mixtures or water. By this poſition the column of mercury was hanging in the tube, ſupported by the preſſure of the atmoſphere; and the elaſticity of the included air was meaſured by the difference between the ſuſpended column and the common barometer.

261 The following table contains the expanſion of 1000 parts of air, nearly of the common denſity, by heating it from 0 to 212. The firſt column contains the height of the barometer; the ſecond contains this height augmented by the ſmall column of mercury in the tube of the manometer, and therefore expreſſes the denſity of the air examined; the third contains the total expanſion of 1000 parts; and the fourth contains the expanſion for 1°, ſuppoſing it uniform throughout.

TABLE D.

Barom.	Denſity of Air examined	Expanſion of 1000 pts by 212°.	Expanſion by 1°.
29.95	31.52	483.89	2.2825
30.07	30.77	482.10	2.2741
29.48	29.90	480.74	2.2676
29.90	30.73	485.86	2.2918
29.96	30.92	489.45	2.3087
29.90	30.55	476.04	2.2455
29.95	30.60	487.55	2.2998
30.07	30.60	482.80	2.2774
29.48	30.00	489.47	2.3087
Mean	30.62	484.21	2.2840

Hence it appears, that the mean expanſion of 1000 parts of air of the denſity 30.62 by one degree of Fahrenheit's thermometer is 2.284, or that 1000 becomes 1002.284.

262 If this expanſion be ſuppoſed to follow the ſame rate that was obſerved in the compariſon of the mercurial and air thermometer, we ſhall find that the expanſion of a thouſand parts of air for one degree of heat at the different intermediate temperatures will be as in the following table.

TABLE E.

Temp.	Total Expanſion.	Expanſion for 1°.	Temp.	Total Expanſion.	Expanſion for 1°.
212	484.210	2.0099	72	172.671	2.5581
192	444.011	2.0080	62	147.090	2.6037
172	402.452	2.1475	52	121.053	2.5124
152	359.503	2.2155	42	95.929	2.4211
132	315.193	2.2840	32	71.718	2.3297
112	269.513	2.3754	22	48.421	2.2383
92	222.006	2.4211	12	26.038	2.1698
82	197.795	2.5124	0		
72	172.671				

Taking heights.

If we would have a mean expanſion for any particular range, as between 12° and 92°, which is the moſt likely to comprehend all the geodætical obſervations, we need only take the difference of the bulks 26.038 and 222.006.=195.968, and divide this by the interval of temperature 80°, and we obtain 2.4496, or 2.45 for the mean expanſion for 1°.

263 It would perhaps be better to adapt the table to a maſs of 1000 parts of air of the ſtandard temperature 32°; for in its preſent form it ſhows the expanſibility of air originally of the temperature 0. This will be done with ſufficient accuracy by ſaying (for 212°) 1071.718 : 1484.210=1000. : 13849, and ſo of the reſt. Thus we ſhall conſtruct the following table of the expanſion of 10,000 parts of air.

TABLE F.

Temp.	Bulk.	Differ.	Expanſ. for 1°.
212	13489	375	18.7
192	13474	387	19.3
172	13087	392	19.6
152	12685	413	20.6
132	12272	426	21.3
112	11846	443	22.1
92	11403	226	22.6
82	11177	235	23.5
72	10942	238	23.8
62	10704	243	24.3
52	10461	235	23.5
42	10226	226	22.6
32	10000	217	21.7
22	9783	209	20.9
12	9574	243	20.2
0	9331		

This will give for the mean expanſion of 1000 parts of air between 12° and 92=2.29.

264 General Roy's experiments on air above the common denſity,

Although it cannot happen that in meaſuring the differences of elevation near the earth's ſurface, we ſhall have occaſion to employ air greatly exceeding the common denſity, we may inſert the experiments made by General Roy on ſuch airs. They are expreſſed in the following table; where column firſt contains the denſities meaſured by the inches of mercury that they will ſupport when of the temperature 32°: column ſecond is the expanſion of 1000 parts of ſuch air by being heated from 0 to 212; and column third is the mean expanſion for 1°.

TABLE G.

	Denſity.	Expanſion for 212.	Expanſ. for 1°.
	101.7	451.54	2.130
	92.3	423.23	1.996
	80.5	412.09	1.944
	54.5	439.87	2.075
	49.7	443.24	2.091
Mean	75.7	434	2.047

265 And on air below that denſity.

We have much more frequent occaſion to operate in air that is rarer than the ordinary ſtate of the ſuperficial atmoſphere.

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atmoſphere. General Roy accordingly made many experiments on ſuch airs. He found in general, that their expanſibility by heat was analogous to that of air in its ordinary denſity, being greateſt about the temperature 60°. He found, too, that its expanſibility by heat diminiſhed with its denſity, but he could not determine the law of gradation. When reduced to about one fifth of the denſity of common air, its expanſion was as follows.

TABLE H.

Temp.	Bulk.	Difference.	Expanſion for 1°.
212	1141.504	7.075	0.354
192	1134.429	12.264	0.613
172	1122.165	14.150	0.708
152	1108.015	14.151	0.708
132	1093.864	14.228	0.711
112	1079.636	14.937	0.747
92	1064.699	20.911	1.045
72	1043.788	25.943	1.297
52	1017.845	17.845	0.892
32	1000.000		
		Mean expanſion	0.786

266 Air of ordinary denſity expands moſt, &c.

From this very extenſive and judicious range of experiments, it is evident that the expanſibility of air by heat is greateſt when the air is about its ordinary denſity, and that in ſmall denſities it is greatly diminiſhed. It appears alſo, that the law of compreſſion is altered; for in this ſpecimen of the rare air half of the whole expanſion happens about the temperature 99°, but in air of ordinary denſity at 105°. This being the caſe, we ſee that the experiments of Mr Amontons, narrated in the Memoirs of the Academy at Paris 1702, &c. are not inconſiſtent with thoſe more perſpicuous experiments of General Roy. Amontons found, that whatever was the denſity of the air, at leaſt in caſes much denſer than ordinary air, the change of 180° of temperature increaſed its elaſticity in the ſame proportion: for he found, that the column of mercury which it ſupported when of the temperature 50, was increaſed one-third at the temperature 212. Hence he haſtily concluded, that its expanſibility was increaſed in the ſame proportion; but this by no means follows, unleſs we are certain that in every temperature the elaſticity is proportional to the denſity. This is a point which ſtill remains undecided; and it merits attention, becauſe if true it eſtabliſhes a remarkable law concerning the action of heat, which would ſeem to go to prove that the elaſticity of fluids is the property of the matter of fire, which it ſuperinduces on every body with which it combines in the form of vapour.

267 The height which produces a given fall in the barometer, increaſes with the air's expanſion.

After this account of the expanſion of air, we ſee that the height through which we muſt riſe in order to produce a given fall of the mercury in the barometer, or the thickneſs of the ſtratum of air equiponderant with a tenth of an inch of mercury, muſt increaſe with the expanſion of air; and that if $\frac{2.29}{1000}$ be the expanſion for one degree, we muſt multiply the exceſs of the temperature of the air above 32° by 0.00229, and multiply the product by 87, in order to obtain the thickneſs of the ſtratum where the barometer ſtands at 30 inches. Or whatever be the elevation indicated by the difference of the barometrical heights, upon the ſuppoſition that the air is of the temperature 32°, we muſt multiply this by 0.00229 for every degree that the air is warmer or colder than 32. The product muſt be added to the elevation in the firſt caſe, and ſubtracted in the latter.

Taking heights.

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Sir George Shuckburgh deduces 0.00244 from his experiments as the mean expanſion of air in the ordinary caſes: and this is probably nearer the truth; becauſe General Roy's experiments were made on air which was freer from damp than the ordinary air in the fields: and it appears from his experiments, that a very minute quantity of damp increaſes its expanſibility by heat in a prodigious degree.

269 Difficulties in this mode of meaſuring heights.

The great difficulty is how to apply this correction; or rather, how to determine the temperature of the air in thoſe extenſive and deep ſtrata in which the elevations are meaſured. It ſeldom or never happens that the ſtratum is of the ſame temperature throughout. It is commonly much colder aloft; it is alſo of different conſtitutions. Below it is warm, loaded with vapour, and very expanſible; above it is cold, much drier, and leſs expanſible, both by its dryneſs and its rarity. The currents of wind are often diſpoſed in ſtrata, which long retain their places; and as they come from different regions, are of different temperatures and different conſtitutions. We cannot therefore determine the expanſion of the whole ſtratum with preciſion, and muſt content ourſelves with an approximation: and the beſt approximation that we can make is, by ſuppoſing the whole ſtratum of a mean temperature between thoſe of its upper and lower extremity, and employ the expanſion correſponding to that mean temperature.

This, however, is founded on a gratuitous ſuppoſition, that the whole intermediate ſtratum expands alike, and that the expanſion is equable in the different intermediate temperatures; but neither of theſe is warranted by experiment. Rare air expands leſs than what is denſer; and therefore the general expanſion of the whole ſtratum renders its denſity more uniform. Dr Horſley has pointed out ſome curious conſequences of this in Phil. Tranſ. vol. lxiv. There is a particular elevation at which the general expanſion, inſtead of diminiſhing the denſity of the air, increaſes it by the ſuperior expanſion of what is below; and we know that the expanſion is not equable in the intermediate temperatures: but we cannot find out a rule which will give us a more accurate correction than by taking the expanſion for the mean temperature.

When we have done this, we have carried the method of meaſuring heights by the barometer as far as it can go; and this ſource of remaining error makes it needleſs to attend to ſome other very minute equations which theory points out. Such is the diminution of the weight of the mercury by the change of diſtance from the centre of the earth. This accompanies the diminution of the weight of the air, but neither ſo as to compenſate it, nor to go along with it *par. paſſu*.

After all, there are found caſes where there is a regular deviation from theſe rules, of which we cannot give any very ſatisfactory account. Thus it is found, that in the province of Quito in Peru, which is at a great elevation above the ſurface of the ocean, the heights obtained by theſe rules fall conſiderably ſhort of

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Barometer. the real heights, and at Spitzbergen they conſiderably exceed them. It appears that the air in the circumpolar regions is denſer than the air of the temperate climates when of the ſame heat and under the ſame preſſure; and the contrary ſeems to be the caſe with the air in the torrid zone. It would ſeem that the ſpecific gravity of air to mercury is at Spitzbergen about 1 to 10224, and in Peru about 1 to 13100. This difference is with great probability aſcribed to the greater dryneſs of the circumpolar air.

This ſource of error will always remain; and it is combined with another, which ſhould be attended to by all who practiſe this method of meaſuring heights, namely, a difference in the ſpecific gravity of the quickſilver. It is thought ſufficiently pure for a barometer when it is cleared of all calcinable matter, ſo as not to drag or ſully the tube. In this ſtate it may contain a conſiderable portion of other metals, particularly of ſilver, biſmuth, and tin, which will diminiſh its ſpecific gravity. It has been obtained by revivification from cinnabar of the ſpecific gravity 14.229, and it is thought very fine if 13.65. Sir George Shuckburgh found the quickſilver which agreed preciſely with the atmoſpherical obſervations on which the rules are founded, to have the ſpecific gravity 13.61. It is ſeldom obtained ſo heavy. It is evident that theſe variations will change the whole reſults; and that it is abſolutely neceſſary, in order to obtain preciſion, that we know the denſity of the mercury employed. The ſubtangent of the atmoſpherical logarithmic, or the height of the homogeneous atmoſphere, will increaſe in the ſame proportion with the denſity of the mercury; and the elevation correſponding to one-tenth of an inch of barometric height will change in the ſame proportion.

We muſt be contented with the remaining imperfections: and we can readily ſee, that, for any purpoſe that can be anſwered by ſuch meaſurements of great heights, the method is ſufficiently exact; but it is quite inadequate to the purpoſe of taking accurate levels, for directing the conſtruction of canals, aqueducts, and other works of this kind, where extreme preciſion is abſolutely neceſſary.

We ſhall now deduce from all that has been ſaid on this ſubject ſets of eaſy rules for the practice of this mode of meaſurement, illuſtrating them by an example.

1. *M. DE LUC's Method.*

270 Mode of meaſuring heights by the barometer according to De Luc,

I. Subtract the logarithm of the barometrical height at the upper ſtation from the logarithm of that at the lower, and count the index and four firſt decimal figures of the remainder as fathoms, the reſt as a decimal fraction. Call this the *elevation.*

II. Note the different temperatures of the mercury at the two ſtations, and the mean temperature. Multiply the logarithmic expanſion correſponding to this mean temperature (in Table B, p. 709.) by the difference of the two temperatures, and ſubtract the product from the elevation if the barometer has been coldeſt at the upper ſtation, otherwiſe add it. Call the difference or the ſum the *approximated elevation.*

III. Note the difference of the temperatures of the air at the two ſtations by a detached thermometer, and alſo the mean temperature and its difference from 32°. Multiply this difference by the expanſion of air for the mean temperature, and multiply the approximate elevation by 1± this product, according as the air is above or below 32°. The product is the correct elevation in fathoms and decimals. Meaſuring heights.

Example.

Suppoſe that the mercury in the barometer at the lower ſtation was at 29.4 inches, that its temperature was 50°, and the temperature of the air was 45; and let the height of the mercury at the upper ſtation be 25.19 inches, its temperature 46, and the temperature of the air 39. Thus we have

☿ al Hts.	Temp. ☿.	Mean.	Temp. Air.	Mean.
29.4	50	48	45	42
25.19	46 4		30	

I. Log. of 29.4 - - - 1.4683473
Log. of 25.19 - - - 1.4012282

Elevation in fathoms - 671.191

II. Expanſ. for 48° .473
Multiply - - 4
. 1.892

Approximated elevation - 669.299

III. Expanſ. of air at 42 0.00238
× 42—32,=10° 10
0.0238
Multiply - - 669.2990
By - - - 1.0238

Product = the correct elevation 685.228

2. *Sir GEORGE SHUCKBURGH's Method.*

271 and according to Shuckburgh.

I. Reduce the barometric heights to what they would be if they were of the temperature 32°.

II. The difference of the logarithms of the reduced barometrical heights will give the approximate elevation.

III. Correct the approximated elevation as before.

Same Example.

I. Mean expanſ. for 1° from Tab. A, is 0.000111.
18° × 0.000111 × 29.4 = - - 0.059
Subtract this from - - 29.4

Reduced barometric height - 29.341
Expanſ. from Tab. A is 0.000111.
14° × 0.000111 × 25.19 - - 0.039
Subtract from - - 25.190

Reduced barometric height - 25.151

II. Log. 29.341 - - 1.4674749
Log. 25.151 - . 1.4005553

Approximated elevation - 669.196

III. This multiplied by 1.0238 gives 685.125

272 Remarks on this method.

Remark. 1. If 0.000101 be ſuppoſed the mean expanſion of mercury for 1°, as Sir George Shuckburgh determines it, the reduction of the barometric heights will be had ſufficiently exact by multiplying the obſerved heights of the mercury by the difference of its temperatures from 32, and cutting off four more decimal places; thus $29.4\,\frac{\times 18}{10000}$ gives the reduced height 29.347, and $25.19 \times \frac{14}{10000}$ gives 25.155, and the difference of their logarithms gives 669.4 fathoms for the approximated elevation, which differs from the one given above by no more than 15 inches.

273 *Remark* 2. If 0.0024 be taken for the expanſion of air for one degree, the correction for this expanſion will be had by multiplying the approximated elevation by 12, and this product by the ſum of the differences of the temperatures from 32°, counting the difference as negative when the temperature is below 32, and cutting off four places; thus $669.196 \times 12 \times \overline{13+07} \times \frac{1}{10000} =$ 16.061, which added to 669,196 gives 685.257, differing from the former only 9 inches.

274 An eaſy rule without the help of tables.

From the ſame premiſes we may derive a rule, which is abundantly exact for all geodætical purpoſes, and which requires no tables of any kind, and is eaſily remembered.

1. The height through which we muſt riſe in order to produce any fall of the mercury in the barometer, is inverſely proportional to the denſity of the air, that is, to the height of the mercury in the barometer.

2. When the barometer ſtands at 30 inches, and the air and quickſilver are of the temperature 32, we muſt riſe through 87 feet, in order to produce a depreſſion of $\frac{1}{10}$ of an inch.

3. But if the air be of a different temperature, this 87 feet muſt be increaſed or diminiſhed by 0.21 of a foot for every degree of difference of the temperature from 32°.

4. Every degree of difference of the temperatures of the mercury at the two ſtations makes a change of 2.833 feet, or 2 feet 10 inches in the elevation.

Hence the following rule.

275 1. Take the difference of the barometric heights in tenths of an inch. Call this *d*.

2. Multiply the difference *a* between 32, and the mean temperature of the air by 21, and take the ſum or difference of this product and 87 feet. This is the height through which we muſt riſe to cauſe the barometer to fall from 30 inches to 29.9. Call this height *h*.

Let *m* be the mean between the two barometric heights. Then $\frac{30hd}{m}$ is the approximated elevation very nearly.

Multiply the difference ∂ of the mercurial temperatures by 2.83 feet, and add this product to the approximated elevation if the upper barometer has been the warmeſt, otherwiſe ſubtract it. The reſult, that is, the ſum or difference, will be the corrected elevation.

Same Example.

$$d = 294 - 251.9 = 42.1$$
$$b = 87 + 10 \times 0.21, = 89.1$$
$$m = \frac{29.4 + 25.19}{2} = 27.29$$

Approx. elevation $= \frac{30 \times 42.1 \times 89.1}{27.29}, = 4123\ 24$ feet.

Corr. for temp. of mercury, $= 4 \times 2.83$		11 32
Corrected elevation in feet	-	4111.92
Ditto in fathoms	- - -	685.32

Differing from the former only 15 inches.

Meaſuring Heights.

276 This rule may be expreſſed by the following ſimple and eaſily remembered formula, where *a* is the difference between 32° and the mean temperature of the air, *d* is the difference of barometric heights in tenths of an inch, *m* is the mean barometric height, ∂ the difference between the mercurial temperatures, and E is the correct elevation.

$$E = \frac{30.\overline{87 \pm 0.21a})d}{m} \pm \partial \times 2.83.$$

277 Heights of ſome remarkable mountains.

We ſhall now conclude this ſubject by an account of ſome of the moſt remarkable mountains, &c. on the earth, above the ſurface of the ocean, in feet.

Mount Puy de Domme in Auvergne, the firſt mountain meaſured by the barometer		5083
Mount Blanc	Alps	15662
Monte Roſa		15084
Aiguille d'Argenture		13402
Monaſtery of St Bernard		7944
Mount Cenis		9212
Pic de los Reyes	Pyrenees	7620
Pic du Médi		9300
Pic d'Oſſano		11700
Canegou		8544
Lake of Geneva		1232
Mount Ætna		10954
Mount Veſuvius		3938
Mount Hekla in Iceland		4887
Snowdown		3555
Ben More		3723
Ben Lawers		3858
Ben Gloe		3472
Schehallion		3461
Ben Lomond		3180
Tinto		2342
Table Hill, Cape of Good Hope		3454
Gondar city in Abyſſinia		8440
Source of the Nile		8082
Pic of Teneriffe		14026
Chimboraço		19595
Cayambourow		19391
Antiſana		19290
Pinchinha ((ſee PERU, n° 56.)		15670
City of Quito (ſee ditto)		9977
Caſpian ſea below the ocean		306

This laſt is ſo ſingular, that it is neceſſary to give the authority on which this determination is founded. It is deduced from nine years obſervations with the barometer at Aſtrachan by Mr Lecre, compared with a ſeries of obſervations made with the ſame barometer at St Peterſburgh.

278 Improved barometers, & deſcription of Hooke's.

This employment of the barometer has cauſed it to become a very intereſting inſtrument to the philoſopher and to the traveller; and many attempts have been made of late to improve it, and render it more portable. The improvements have either been directed to the enlargement of its range, or to the more accurate meaſurement of its preſent ſcale. Of the firſt kind are Hooke's wheel barometer, the diagonal barometer, and the horizontal barometer, deſcribed in a former part of this work. See Barometer. In that place are alſo deſcribed two very ingenious contrivances of Mr Rownings, which are evidently not portable. Of all the barometers with an enlarged ſcale the beſt is that invented by Dr Hooke in 1668, and deſcribed in the Phil. Tranſ. N° 185. The invention was alſo claimed by Huyghens and by De la Hire; but Hooke's was publiſhed long before.

Plate cccxxx. Fig. 73. It conſiſts of a compound tube ABCDEFG (fig. 73.), of which the parts AB and DE are equally wide, and EFG as much narrower as we would amplify the ſcale. The parts AB and EG muſt alſo be as perfectly cylindrical as poſſible. The part HBCDI is filled with mercury, having a vacuum above in AB. IF is filled with a light fluid, and FG with another light fluid which will not mix with that in IF. The ciſtern G is of the ſame diameter as AB. It is eaſy to ſee that the range of the ſeparating ſurface at F muſt be as much greater than that of the ſurface I as the area of I is greater than that of F. And this ratio is in our choice. This barometer is free from all the bad qualities of thoſe formerly deſcribed, being moſt delicately moveable; and is by far the fitteſt for a chamber, for amuſement, by obſervations on the changes of the atmoſpheric preſſure. The ſlighteſt breeze cauſes it to riſe and fall, and it is continually in motion.

279 Inferior to the common one for the meaſurement of heights.

But this, and all other contrivances of the kind, are inferior to the common barometer for meaſurement of heights, on account of their bulk and cumberſomeneſs: nay, they are inferior for all philoſophical purpoſes in point of accuracy; and this for a reaſon that admits of no reply. Their ſcale muſt be determined in all its parts by the common barometer; and, therefore, notwithſtanding their great range, they are ſuſceptible of no greater accuracy than that with which the ſcale of a common barometer can be obſerved and meaſured. This will be evident to any perſon who will take the trouble to conſider how the points of their ſcale muſt be aſcertained. The moſt accurate method for graduating ſuch a barometer as we have now deſcribed would be to make a mixture of vitriolic acid and water, which ſhould have $\frac{1}{10}$ of the denſity of mercury. Then, let a long tube ſtand vertical in this fluid, and connect its upper end with the open end of the barometer by a pipe which has a branch to which we can apply the mouth. Then if we ſuck through this pipe, the fluid will riſe both in the barometer and in the other tube; and 10 inches riſe in this tube will correſpond to one inch deſcent in the common barometer. In this manner may every point of the ſcale be adjuſted in due proportion to the reſt. But it ſtill remains to determine what particular point of the ſcale correſponds to ſome determined inch of the common barometer. This can only be done by an actual compariſon; and this being done, the whole becomes equally accurate. Except therefore for the mere purpoſe of chamber amuſement, in which caſe the barometer laſt deſcribed has a decided preference, the common barometer is to be preferred; and our attention ſhould be entirely directed to its improvement and portability.

280 How the common one might be improved.

For this purpoſe it ſhould be furniſhed with two microſcopes or magnifying glaſſes, one of them ſtationed at the beginning of the ſcale; which ſhould either be moveable, ſo that it may always be brought to the ſurface of the mercury in the ciſtern, or the ciſtern ſhould be ſo contrived that its ſurface may always be brought to the beginning of the ſcale. The glaſs will enable us to ſee the coincidence with accuracy. The other microſcope muſt be moveable, ſo as to be ſet oppoſite to the ſurface of the mercury in the tube; and the ſcale ſhould be furniſhed with a vernier which divides an inch into 1000 parts, and be made of materials of which we know the expanſion with great preciſion.

For an account of many ingenious contrivances to the make inſtruments accurate, portable, and commodious, conſult Magellan, *Diſſer. de diverſes Inſtr. de Phyſ.*; *Phil. Tranſ.* lxvii. lxviii. *Journ. de Phyſ.* xix. 108. 346. xvi. 392. xviii. 391. xxi. 436. xxii. 390.; Sulzer, *Act. Helvet.* iii. 259.; De Luc, *Recherches ſur les Modifications de l' Atmoſphere*, i. 401. ii. 459, 490. De Luc's ſeems the moſt ſimple and perfect of them all. Cardinal de Luynes (*Mem. Par.* 1768); Prinſ. De Luc, *Recherches*, § 63.; Van Swinden's *Poſitiones Phyſicæ*; *Com. Acad. Petrop.* i.; *Com. Acad. Petrop. Nov.* ii. 200 viii. 281

Thus we have given an elementary account of the diſtinguiſhing properties of air as a heavy and compreſſible fluid, and of the general phenomena which are immediate conſequences of theſe properties. This we have done in a ſet of propoſitions analogous to thoſe which form the doctrines of hydroſtatics. It remains to conſider it in another point of view, namely, as moveable and inert. The phenomena conſequent on theſe properties are exhibited in the velocities which air acquires by preſſure, in the reſiſtance which bodies meet with to their motion through the air, and in the impreſſion which air in motion gives to bodies expoſed to its action.

We ſhall firſt conſider the motions of which air is ſuſceptible when the equilibrium of preſſure (whether ariſing from its weight or its elaſticity) is removed; and, in the next place, we ſhall conſider its action on ſolid bodies expoſed to its current, and the reſiſtance which it makes to their motion through it.

282 Doctrine of air in acceſſible ſituations as acted on by equal and parallel gravity,

In this conſideration we ſhall avoid the extreme of generality, which renders the diſcuſſion too abſtract and difficult, and adapt our inveſtigation to the circumſtances in which compreſſible fluids (of which air is taken for the repreſentative) are moſt commonly found. We ſhall conſider air therefore as it is commonly found in acceſſible ſituations, as acted on by equal and parallel gravity; and we ſhall conſider it in the ſame order in which water is treated in a ſyſtem of hydraulics.

283 analogous to the doctrine of water in hydraulics.

In that ſcience the leading problem is to determine with what velocity the water will move through a given orifice when impelled by ſome known preſſure; and it has been found, that the beſt form in which this moſt difficult and intricate propoſition can be put, is to determine the velocity of water flowing through this orifice when impelled by its weight alone. Having determined this, we can reduce to this caſe every queſtion which can be propoſed; for, in place of the preſſure of any piſton or other mover, we can always ſubſtitute a perpendicular column of water or air whoſe weight ſhall be equal to the given preſſure.

284 The velocity with which air ruſhes into a void by its own weight,

The firſt problem, therefore, is to determine with what velocity air will ruſh into a void when impelled by its weight alone. This is evidently analogous to the hydraulic problem of water flowing out of a veſſel.

And here we muſt be contented with referring our readers to the ſolutions which have been given of that problem, and the demonſtration that it flows with the velocity which a heavy body would acquire by falling from a height equal to the depth of the hole under the ſurface of the water in the veſſel. In whatever way we attempt to demonſtrate that propoſition, every ſtep, every word, of the demonſtration applies equally to the air, or to any fluid whatever. Or, if our readers ſhould wiſh to ſee the connection or analogy of the caſes, we only deſire them to recollect an undoubted maxim in the ſcience of motion, that *when the moving force and the matter to be moved vary in the ſame proportion, the velocity will be the ſame*. If therefore there be ſimilar veſſels of air, water, oil, or any other fluid, all of the height of a homogeneous atmoſphere, they will all run through equal and ſimilar holes with the ſame velocity; for in whatever proportion the quantity of matter moving through the hole be varied by a variation of denſity, the preſſure which forces it out, by acting in circumſtances perfectly ſimilar, varies in the ſame proportion by the ſame variation of denſity.

We muſt therefore aſſume it as the leading propoſition, that *air ruſhes from the atmoſphere into a void with the velocity which a heavy body would acquire by falling from the top of a homogeneous atmoſphere.*

It is known that air is about 840 times lighter than water, and that the preſſure of the atmoſphere ſupports water at the height of 33 feet nearly. The height therefore of a homogeneous atmoſphere is nearly 33×840, or 27720 feet. Moreover, to know the velocity acquired by any fall, recollect that a heavy body by falling one foot acquires the velocity of 8 feet per ſecond; and that the velocities acquired by falling through different heights are as the ſquare roots of the heights. Therefore to find the velocity correſponding to any height, expreſſed in feet per ſecond, multiply the ſquare root of the height by 8. We have therefore in the preſent inſtance $V=\sqrt{27720}, =8\times 166.493, =1332$ feet per ſecond. This therefore is the velocity with which common air will ruſh into a void; and this may be taken as a ſtandard number in pneumatics, as 16 and 32 are ſtandard numbers in the general ſcience of mechanics, expreſſing the action of gravity at the ſurface of the earth.

It is eaſy to ſee that greater preciſion is not neceſſary in this matter. The height of a homogeneous atmoſphere is a variable thing, depending on the temperature of the air. If this reaſon ſeems any objection againſt the uſe of the number 1332, we may retain $8\sqrt{H}$ in place of it, where H expreſſes the height of a homogeneous atmoſphere of the given temperature. A variation of the barometer makes no change in the velocity, nor in the height of the homogeneous atmoſphere, becauſe it is accompanied by a proportional variation in the denſity of the air. When it is increaſed $\frac{1}{10}$, for inſtance, the denſity is alſo increaſed $\frac{1}{10}$; and thus the expelling force and the matter to be moved are changed in the ſame proportion, and the velocity remains the ſame. N. B. We do not here conſider the velocity which the air acquires after its iſſuing into the void by its continual expanſion. This may be aſcertained by the 39th prop. of Newton's *Principia*, b. i. Nay, which appears very paradoxical, if a cylinder of air, communicating in this manner with a void, be compreſſed by a piſton loaded with a weight, which preſſes it down as the air flows out, and thus keeps it of the ſame denſity, the velocity of efflux will ſtill be the ſame, however great the weight may chance to be; for the firſt and immediate effect of the load on the piſton is to reduce the air in the cylinder to ſuch a denſity that its elaſticity ſhall exactly balance the load; and becauſe the elaſticity of air is proportional to its denſity, the denſity of the air will be increaſed in the ſame proportion with the load, that is, with the expelling power (for we are neglecting at preſent the weight of the included air as too inconſiderable to have any ſenſible effect). Therefore, ſince the matter to be moved is increaſed in the ſame proportion with the preſſure, the velocity will be the ſame as before.

255 and the velocity with which it ruſhes into a ſpace containing rarer air.

It is equally eaſy to determine the velocity with which the air of the atmoſphere will ruſh into a ſpace containing rarer air. Whatever may be the denſity of this air, its elaſticity, which follows the proportion of its denſity, will balance a proportional part of the preſſure of the atmoſphere; and it is the exceſs of this laſt only which is the moving force. The matter to be moved is the ſame as before. Let D be the natural denſity of the air, and δ the denſity of the air contained in the veſſel into which it is ſuppoſed to run, and let P be the preſſure of the atmoſphere, and therefore equal to the force which impels it into a void; and let π be the force with which this rarer air would run into a void. We have $D:\delta=P:\pi$, and $\tau=\frac{P\delta}{D}$. Now the moving force in the preſent inſtance is $P-\pi$, or $P-\frac{P\delta}{D}$. Laſtly, let V be the velocity of air ruſhing into a void, and v the velocity with which it will ruſh into this rarefied air.

It is a theorem in the motion of fluids, that the preſſures are as the ſquares of the velocities of efflux. Therefore $P:P-\frac{P\delta}{D}=V^2:v^2$. Hence we derive $v^2=V^2\times\overline{1-\frac{\delta}{D}}$, and $v\times V=\sqrt{1-\frac{\delta}{D}}$. We do not here conſider the reſiſtance which the air of the atmoſphere will meet with from the inertia of that in the veſſel which it muſt diſplace in its motion.

Here we ſee that there will always be a current into the veſſel while δ is leſs than D.

We alſo learn the gradual diminution of the velocity as the veſſel fills; for δ continually increaſes, and therefore $1-\frac{\delta}{D}$ continually diminiſhes.

It remains to determine the time t expreſſed in ſeconds, in which the air of the atmoſphere will flow into this veſſel from its ſtate of vacuity till the air in the veſſel has acquired any propoſed denſity δ.

For this purpoſe let H, expreſſed in feet, be the height through which a heavy body muſt fall in order to acquire the velocity V, expreſſed alſo in feet per ſecond. This we ſhall expreſs more briefly in future, by calling it the height producing the velocity V. Let C repreſent the capacity of the veſſel, expreſſed in cubic feet, and O the area or ſection of the orifice, expreſſed in ſuperficial or ſquare feet; and let the natural denſity of the air be D.

Since the quantity of aerial matter contained in a veſſel depends on the capacity of the veſſel and the denſity of the air jointly, we may expreſs the air which would fill this veſſel by the ſymbol CD when the air is in its ordinary ſtate, and by $C\partial$ when it has the denſity ∂. In order to obtain the rate at which it fills, we muſt take the fluxion of this quantity $C\partial$. This is $C\dot{\partial}$; for C is a conſtant quantity, and ∂ is a variable or flowing quantity.

But we alſo obtain the rate of influx by our knowledge of the velocity, and the area of the orifice, and the denſity. The velocity is V, or $8\sqrt{H}$, at the firſt inſtant; and when the air in the veſſel has acquired the denſity ∂, that is, at the end of the time t, the velocity is $8\sqrt{H}\sqrt{1-\frac{\partial}{D}}$, or $8\sqrt{H}\sqrt{\frac{D-\partial}{D}}$, or $8\sqrt{H}\frac{\sqrt{D-\partial}}{\sqrt{D}}$.

The rate of influx therefore (which may be conceived as meaſured by the little maſs of air which will enter during the time $\dot{t}$ with this velocity) will be $\frac{8\sqrt{HOD}\sqrt{D-\partial}\,\dot{t}}{\sqrt{D}}$, or $8\sqrt{HO}\sqrt{D}\sqrt{D-\partial}\,\dot{t}$, multiplying the velocity by the orifice and the denſity.

Here then we have two values of the rate of influx. By ſtating them as equal we have a fluxionary equation, from which we may obtain the fluents, that is, the time t in ſeconds neceſſary for bringing the air in the veſſel to the denſity ∂, or the denſity ∂ which will be produced at the end of any time t. We have the equation $8\sqrt{HO}\sqrt{D}\sqrt{D-\partial}\,\dot{t}=C\dot{\partial}$. Hence we derive $\dot{t}=\frac{C}{8\sqrt{HO}\sqrt{D}}\times\frac{\dot{\partial}}{\sqrt{D-\partial}}$. Of this the fluent is $t=\frac{C}{4\sqrt{HO}\sqrt{D}}\times\sqrt{D-\partial}+A$, in which A is a conditional conſtant quantity. The condition which determines it is, that t muſt be nothing when ∂ is nothing, that is, when $\sqrt{D-\partial}=\sqrt{D}$; for this is evidently the caſe at the beginning of the motion. Hence it follows, that the conſtant quantity is $\sqrt{D}$, and the complete fluent, ſuited to the caſe, is

$$\frac{C}{4\sqrt{HO}\sqrt{D}}\times\overline{\sqrt{D}-\sqrt{D-\partial}}.$$

The motion ceaſes when the air in the veſſel has acquired the denſity of the external air; that is, when $\partial=D$, or when $t=\frac{C}{4\sqrt{HO}\sqrt{D}}\times\sqrt{D}$, $=\frac{C}{4\sqrt{HO}}$. Therefore the time of completely filling the veſſel is $\frac{C}{4\sqrt{HO}}$.

286 Illuſtrated by examples in numbers.

Let us illuſtrate this by an example in numbers.

Suppoſing then that air is 840 times lighter than water, and the height of the homogeneous atmoſphere 27720 feet, we have $4\sqrt{H}=666$. Let us further ſuppoſe the veſſel to contain 8 cubic feet, which is nearly a wine hogſhead, and that the hole by which the air of the ordinary denſity, which we ſhall make $=1$, enters is an inch ſquare, or $\frac{1}{144}$ of a ſquare foot. Then the time in ſeconds of completely filling it will be $\frac{8'}{\frac{1}{144}666}$, or $\frac{1152''}{666}$, or $1.7297''$ If the hole is only $\frac{1}{100}$ of a ſquare inch, that is, if its ſide is $\frac{1}{10}$ of an inch, the time of completely filling the hogſhead will be $173''$ very nearly, or ſomething leſs than three minutes.

If we make the experiment with a hole cut in a thin plate, we ſhall find the time greater nearly in the proportion of 63 to 100, for reaſons obvious to all who have ſtudied hydraulics. In like manner we can tell the time neceſſary for bringing the air in the veſſel to $\frac{3}{4}$ of its ordinary denſity. The only variable part of our fluent is the coefficient $-\sqrt{D-\partial}$, or $\sqrt{1-\partial}$. Let ∂ be $=\frac{3}{4}$, then $\sqrt{1-\partial}=\sqrt{\frac{1}{4}}=\frac{1}{2}$, and $1-\sqrt{1-\partial}=\frac{1}{2}$; and the time is $86\frac{1}{2}''$ very nearly when the hole is $\frac{1}{10}$ of an inch wide.

Fig. 81. 287 The velocity of air with the additional impulſe of a weight moving down the veſſel.

Let us now ſuppoſe that the air in the veſſel ABCD (fig. 81.) is compreſſed by a weight acting on the cover AD, which is moveable down the veſſel, and is thus expelled into the external air.

The immediate effect of this external preſſure is to compreſs the air and give it another denſity. The denſity D of the external air correſponds to its preſſure P. Let the additional preſſure on the cover of the veſſel be p, and the denſity of the air in the veſſel be d. We ſhall have $P : P+p=D : d$; and therefore $p=P\times\frac{d-D}{D}$. Then, becauſe the preſſure which expels the air is the difference between the force which compreſſes the air in the veſſel and the force which compreſſes the external air, the expelling force is p. And becauſe the quantities of motion are as the forces which ſimilarly produce them, we ſhall have $P : P\times\frac{d-D}{D}=MV : mv$; where M and m expreſs the quantities of matter expelled, V expreſſes the velocity with which air ruſhes into a void, and v expreſſes the velocity ſought. But becauſe the quantities of aerial matter which iſſue from the ſame orifice in a moment are as the denſities and velocities jointly, we ſhall have $MV : mv=DVV : dvv$, $=DV^2 : dv^2$. Therefore $P : p\frac{d-D}{D}=DV^2 : dv$. Hence we deduce $v=V\sqrt{\frac{d-D}{d}}$.

We may have another expreſſion of the velocity without conſidering the denſity. We had $P : P+p=D : d$: therefore $d=\frac{D\times\overline{P+p}}{P}$, and $d-D=\frac{D\times\overline{P+p}}{P}-D$, $=\frac{D\times\overline{P+p}-DP}{P}$, and $\frac{d-D}{d}=\frac{D\times\overline{P+p}-DP}{D\times\overline{P+p}}$, $=\frac{P+p-P}{P+p}$, $=\frac{p}{P+p}$: therefore $v=V\times\sqrt{\frac{p}{P+p}}$, which is a very ſimple and convenient expreſſion.

288 The effect of the air's elaſticity conſidered.

Hitherto we have conſidered the motion of air as produced by its weight only. Let us now conſider the effect of its elaſticity.

Fig. 81.

Let ABCD (fig. 81.) be a veſſel containing air of any denſity D. This air is in a ſtate of compreſſion; and if the compreſſing force be removed, it will expand, and its elaſticity will diminiſh along with its denſity. Its elaſticity in any ſtate is meaſured by the force which keeps it in that ſtate. The force which keeps common air in its ordinary denſity is the weight of the atmoſphere, and is the ſame with the weight of a column of water 33 feet high. If therefore we ſuppoſe that this air, inſtead of being confined by the top of the veſſel, is preſſed down by a moveable piſton carrying a column of water 33 feet high, its elaſticity will balance this preſſure as it balances the preſſure of the atmoſphere; and as it is a fluid, and propagates through every part the preſſure exerted on any one part, it will preſs on any little portion of the veſſel by its elaſticity in the ſame manner as when loaded with this column.

The conſequence of this reaſoning is, that if this ſmall portion of the veſſel be removed, and thus a paſſage be made into a void, the air will begin to flow out with the ſame velocity with which it would flow when impelled by its weight alone, or with the velocity acquired by falling from the top of a homogeneous atmoſphere, or 1332 feet in a ſecond nearly.

But as ſoon as ſome air has come out, the denſity of the remaining air is diminiſhed, and its elaſticity is diminiſhed; therefore the expelling force is diminiſhed. But the matter to be moved is diminiſhed in the very ſame proportion, becauſe the denſity and elaſticity are found to vary according to the ſame law; therefore the velocity will continue the ſame from the beginning to the end of the efflux.

This may be ſeen in another way. Let P be the preſſure of the atmoſphere, which being the counterbalance and meaſure of the initial elaſticity, is equal to the expelling force at the firſt inſtant. Let D be the initial denſity, and V the initial velocity. Let d be its denſity at the end of the time t of efflux, and v the contemporaneous velocity. It is plain that at the end of this time we ſhall have the expelling force $\pi = \frac{Pd}{D}$; for $D : d = P : \pi\left(= \frac{Pd}{D}\right)$.

Theſe forces are proportional to the quantities of motion which they produce; and the quantities of motion are proportional to the quantities of matter M and m and the velocities V and v jointly: therefore we have $P : \frac{Pd}{D} = MV : mv$. But the quantities of matter which eſcape through a given orifice are as the denſities and velocities jointly; that is, $M : m = DV : dv$: therefore $P : \frac{Pd}{D} = DV^2 : dv^2$, and $P \times dv^2 = \frac{PdDV^2}{D} = PdV^2$, and $V^2 = v^2$, and $V = v$, and the velocity of efflux is conſtant. Hence follows, what appears very unlikely at firſt ſight, that however much the air in the veſſel is condenſed, it will always iſſue into a void with the ſame velocity.

289 Quantity of air iſſuing into a void in a given time, and the denſity at the end of that time.

In order to find the quantity of aerial matter which will iſſue during any time t, and conſequently the denſity of the remaining air at the end of this time, we muſt get the rate of efflux. In the element of time t there iſſues (by what has been ſaid above) the bulk $8\sqrt{HO}\,t$ (for the velocity V is conſtant); and therefore the quantity $8\sqrt{HO}\,d\dot{t}$. On the other hand, the quantity of air at the beginning was CD, C being the capacity of the veſſel; and when the air has acquired the denſity d, the quantity is Cd, and the quantity run out is $CD - Cd$: therefore the quantity which has run out in the time $\dot{t}$ muſt be the fluxion of $CD - Cd$, or $-C\dot{d}$. Therefore we have the equation $8\sqrt{HO}\,d\dot{t} = -C\dot{d}$, and $\dot{t} = \frac{-C\dot{d}}{8\sqrt{HO}\,d}, = \frac{C}{8\sqrt{HO}} \times -\frac{\dot{d}}{d}$.

The fluent of this is $t = \frac{C}{8\sqrt{HO}} \log. d$. This fluent muſt be ſo taken that t may be $= 0$ when $d = D$. Therefore the correct fluent will be $t = \frac{C}{8\sqrt{HO}} \log. \frac{D}{d}$, for $\log. \frac{D}{D} = \log. 1, = 0$. We deduce from this, that it requires an infinite time for the whole air of a veſſel to flow out of it into a void. N. B. By log. d, &c. is meant the hyperbolic logarithm of d, &c.

290 When the veſſel emits it into rarer air.

Let us next ſuppoſe that the veſſel, inſtead of letting out its air into a void, emits it into air of a leſs denſity, which remains conſtant during the efflux, as we may ſuppoſe to be the caſe when a veſſel containing condenſed air emits it into the ſurrounding atmoſphere. Let the initial denſity of the air in the veſſel be ∂, and that of the atmoſphere D. Then it is plain that the expelling force is $P - \frac{PD}{\partial}$, and that after the time t it is $\frac{Pd}{\partial} - \frac{PD}{\partial}$. We have therefore $P - \frac{PD}{\partial} : \frac{Pd}{\partial} - \frac{PD}{\partial} = MV . mv, = \partial V^2 : dv^2$. Whence we derive $v = V\sqrt{\frac{\partial\,\overline{d-D}}{d\,\overline{\partial-D}}}$.

From this equation we learn that the motion will be at an end when $d = D$: and if $\partial = D$ there can be no efflux.

291 Relation between the time and denſity when iſſuing into a void.

To find the relation between the time and the denſity, let H as before be the height producing the velocity V. The height producing the velocity of efflux v muſt be $H \times \frac{\partial\,\overline{d-D}}{d\,\overline{\partial-D}}$, and the little parcel of air which will flow out in the time t will be $= 8\sqrt{HO}\,d\dot{t}\sqrt{\frac{\partial\,\overline{d-D}}{d\,\overline{\partial-D}}}$. On the other hand, it is $= -C\dot{d}$.

Hence we deduce the fluxionary equation $\dot{t} = \frac{C\sqrt{\partial-D}}{8\sqrt{HO}\sqrt{\partial}} \times \frac{-\dot{d}}{\sqrt{d^2-Dd}}$. The fluent of this, corrected ſo as to make $t = 0$ when $d = \partial$, is $t = \frac{C\sqrt{\partial-D}}{8\sqrt{HO}\sqrt{\partial}} \times \log. \left(\frac{\partial - \frac{1}{2}D + \sqrt{\partial^2 - D\partial}}{d - \frac{1}{2}D + \sqrt{d^2 - Dd}}\right)$. And the time of completing the efflux, when $d = D$, is $\dot{t} = \frac{C\sqrt{\partial-D}}{8\sqrt{HO}\sqrt{\partial}} \times \log. \left(\frac{\partial - \frac{1}{2}D + \sqrt{\partial^2 - D\partial}}{\frac{1}{2}D}\right)$.

Fig. 82. 292 When iſſuing from denſer into rarer air.

Laſtly, let ABCD, CFGH (fig. 82.) be two veſſels containing airs of different denſities, and communicating by the orifice C, there will be a current from the veſſel containing the denſer air into that containing the rarer: ſuppoſe from ABCD into CFGH.

Let P be the elaſtic force of the air in ABCD, Q its denſity, and V its velocity, and D the denſity of the air in CFGH. And, after the time t, let the denſity of the air in ABCD be q, its velocity v, and the denſity of the air in CFGH be δ. The expelling force from ABCD will be $\text{P}-\frac{\text{PD}}{\text{Q}}$ at the firſt inſtant, and at the end of the time t it will be $\frac{\text{P}q}{\text{Q}}-\frac{\text{P}\delta}{\text{Q}}$. Therefore we ſhall have $\text{P}-\frac{\text{PD}}{\text{Q}}:\frac{\text{P}q}{\text{Q}}-\frac{\text{P}\delta}{\text{Q}}=\text{QV}^2:qv^2$, which gives $v=\text{V}\times\sqrt{\frac{\text{Q}\,(q-\delta)}{q\,(\text{Q}-\text{D})}}$, and the motion will ceaſe when $\delta=q$.

Let A be the capacity of the firſt veſſel, and B that of the ſecond. We have the ſecond equation $\text{AQ}+\text{BD}=\text{A}\,q+\text{B}\,\delta$, and therefore $\delta=\frac{\text{A}\,(\text{Q}-q)+\text{BD}}{\text{B}}$. Subſtituting this value of δ in the former value of v, we have $v=\times\sqrt{\frac{\text{Q}\,[\text{B}\,(q-\text{D})-\text{A}\,(\text{Q}-q)]}{q\,\text{B}\,(\text{Q}-\text{D})}}$, which gives the relation between the velocity v and the denſity q.

In order to aſcertain the time when the air in ABCD has acquired the denſity q, it will be convenient to abridge the work by ſome ſubſtitutions. Therefore make $\text{Q}\,(\text{B}+\text{A})=\text{M}$, $\text{BQD}+\text{BQ}^2=\text{N}$, $\text{BQ}-\text{BD}=\text{R}$ and $\frac{\text{N}}{\text{M}}=m$. Then, proceeding as before, we obtain the fluxionary equation $8\sqrt{\text{HO}}\,q\frac{\sqrt{\text{M}q-\text{N}}}{\sqrt{\text{R}}\sqrt{q}}\dot{t}=\overline{\text{AQ}-\text{A}q}^{\,\cdot}=-\text{A}\dot{q}$, whence $\dot{t}=\frac{\text{A}\sqrt{\text{R}}}{8\sqrt{\text{HO}}\sqrt{\text{M}}}\times\frac{\dot{q}}{\sqrt{q^2-mq}}$ of which the fluent, completed ſo that $t=o$ when $q=\text{Q}$, is $t=\frac{\text{A}\sqrt{\text{R}}}{8\sqrt{\text{HO}}\sqrt{\text{M}}}\times\log.\left(\frac{\text{Q}-\frac{1}{2}m+\sqrt{(\text{Q}^2m\text{Q})}}{q-\frac{1}{2}m+\sqrt{(q^2mq)}}\right)$.

293 When air is expelled by force, as in bellows.

Some of theſe queſtions are of difficult ſolution, and they are not of frequent uſe in the more important and uſual applications of the doctrines of pneumatics, at leaſt in their preſent form. The caſes of greateſt uſe are when the air is expelled from a veſſel by an external force, as when bellows are worked, whether of the ordinary form or conſiſting of a cylinder fitted with a moveable piſton. This laſt caſe merits a particular conſideration; and, fortunately, the inveſtigation is extremely eaſy.

Fig. 81.

Let AD fig. 81. be conſidered as a piſton moving downward with the uniform velocity f, and let the area of the piſton be n times the area of the hole of efflux, then the velocity of efflux ariſing from the motion of the piſton will be nf. Add this to the velocity V produced by the elaſticity of the air in the firſt queſtion, and the whole velocity will be $\text{V}+nf$. It will be the ſame in the other. The problem is alſo freed from the conſideration of the time of efflux. For this depends now on the velocity of the piſton. It is ſtill, however, a very intricate problem to aſcertain the relation between the time and the denſity, even though the piſton is moving uniformly; for at the beginning of the motion the air is of common denſity. As the piſton deſcends, it both expels and compreſſes the air, and the denſity of the air in the veſſel varies in a very intricate manner, as alſo its reſiſtance or reaction on the piſton. For this reaſon, a piſton which moves uniformly by means of an external force will never make an uniform blaſt by ſucceſſive ſtrokes; it will always be weaker at the beginning of the ſtroke. The beſt way for ſecuring an uniform blaſt is to employ the external force only for lifting up the piſton, and then to let the piſton deſcend by its own weight. In this way it will quickly ſink down, compreſſing the air, till its denſity and correſponding elaſticity exactly balance the weight of the piſton. After this the piſton will deſcend equably, and the blaſt will be uniform. We ſhall have occaſion to conſider this more particularly under the head of *PNEUMATICAL Machines*. Theſe obſervations and theorems will ſerve to determine the initial velocity of the air in all important caſes of its expulſion. The philoſopher will learn the rate of its efflux out of one veſſel into another; the chemiſt will be able to calculate the quantities of the different gaſes which are employed in the curious experiments of the ingenious but unfortunate Lavoiſier on Combuſtion, and will find them extremely different from what he ſuppoſed; the engineer will learn how to proportion the motive force of his machine to the quantity of aerial matter which his bellows muſt ſupply. But it is not enough, for this purpoſe, that the air *begin* to iſſue in the proper quantity; we muſt ſee whether it be not affected by the circumſtances of its ſubſequent paſſage.

294 Paſſage of air through pipes, &c. ſimilar to the motion of water in conduits.

All the modifications of motion which are obſerved in water conduits take place alſo in the paſſage of air through pipes and holes of all kinds. There is the ſame diminution of quantity paſſing through a hole in a thin plate that is obſerved in water. We know that (abating the ſmall effect of friction) water iſſues with the velocity acquired by falling from the ſurface; and yet if we calculate by this velocity and by the area of the orifice, we ſhall find the quantity of water deficient nearly in the proportion of 63 to 100. This is owing to the water preſſing towards the orifice from all ſides, which occaſions a contraction of the jet. The ſame thing happens in the efflux of air. Alſo the motion of water is greatly impeded by all contractions of its paſſage. Theſe oblige it to accelerate its velocity, and therefore require an increaſe of preſſure to force it through them, and this in proportion to the ſquares of the velocities. Thus, if a machine working a pump cauſes it to give a certain number of ſtrokes in a minute, it will deliver a determined quantity of water in that time. Should it happen that the paſſage of the water is contracted to one half in any part of the machine (a thing which frequently happens at the valves), the water muſt move through this contraction with twice the velocity that it has in the reſt of the paſſage. This will require four times the force to be exerted on the piſton. Nay (which will appear very odd, and is never ſuſpected by engineers), if no part of the paſſage is narrower than the barrel of the pump, but on the contrary a part much wider, and if the conduit be again contracted to the width of the barrel, an additional force muſt be applied to the piſton to drive the water through this paſſage, which would not have been neceſſary if the paſſage had not been widened in any part. It will require a force equal to the weight of a column of water of the height neceſſary for communicating a velocity, the ſquare of which is equal to the difference of the ſquares of the velocities of the water in the wide and the narrow part of the conduit.

The ſame thing takes place in the motion of air, and therefore all contractions and dilatations muſt be carefully avoided, when we want to preſerve the velocity unimpaired.

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Air ſuffers the ſame retardation along pipes as water, and the neceſſity of attending to this.

Air alſo ſuffers the ſame retardation in its motion along pipes. By not knowing, or not attending to that, engineers of the firſt reputation have been prodigiouſly diſappointed in their expectations of the quantity of air which will be delivered by long pipes. Its extreme mobility and lightneſs hindered them from ſuſpecting that it would ſuffer any ſenſible retardation. Dr Papin, a moſt ingenious man, propoſed this as the moſt effectual method of transferring the action of a moving power to a great diſtance. Suppoſe, for inſtance, that it was required to raiſe water out of a mine by a water-machine, and that there was no fall of water nearer than a mile's diſtance. He employed this water to drive a piſton, which ſhould compreſs the air in a cylinder communicating, by a long pipe, with another cylinder at the mouth of the mine. This ſecond cylinder had a piſton in it, whoſe rod was to give motion to the pumps at the mine. He expected, that as ſoon as the piſton at the water-machine had compreſſed the air ſufficiently, it would cauſe the air in the cylinder at the mine to force up its piſton, and thus work the pumps. Dr Hooke made many objections to the method, when laid before the Royal Society, and it was much debated there. But dynamics was at this time an infant ſcience, and very little underſtood. Newton had not then taken any part in the buſineſs of the ſociety, otherwiſe the true objections would not have eſcaped his ſagacious mind. Notwithſtanding Papin's great reputation as an engineer and mechanic, he could not bring his ſcheme into uſe in England; but afterwards, in France and in Germany, where he ſettled, he got ſome perſons of great fortunes to employ him in this project; and he erected great machines in Auvergne and Weſtphalia for draining mines. But, ſo far from being effective machines, they would not even begin to move. He attributed the failure to the quantity of air in the pipe of communication, which muſt be condenſed before it can condenſe the air in the remote cylinder. This indeed is true, and he ſhould have thought of this earlier. He therefore diminiſhed the ſize of this pipe, and made his water-machine exhauſt inſtead of condenſing, and had no doubt but that the immenſe velocity with which air ruſhes into a void would make a rapid and effectual communication of power. But he was equally diſappointed here, and the machine at the mine ſtood ſtill as before.

Near a century after this, a very intelligent engineer attempted a much more feaſible thing of this kind at an iron-foundery in Wales. He erected a machine at a powerful fall of water, which worked a ſet of cylinder bellows, the blowpipe of which was conducted to the diſtance of a mile and a half, where it was applied to a blaſt furnace. But notwithſtanding every care to make the conducting pipe very air-tight, of great ſize, and as ſmooth as poſſible, it would hardly blow out a candle. The failure was aſcribed to the impoſſibility of making the pipe air-tight. But, what was ſurpriſing, above ten minutes elapſed after the action of the piſtons in the bellows before the leaſt wind could be perceived at the end of the pipe; whereas the engineer expected an interval of 6 ſeconds only.

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[illegible] the ſubject.

No very diſtinct theory can be delivered on this ſubject; but we may derive conſiderable aſſiſtance in underſtanding the cauſes of the obſtruction to the motion of water in long pipes, by conſidering what happens to air. The elaſticity of the air, and its great compreſſibility, have given us the diſtincteſt notions of fluidity in general, ſhowing us, in a way that can hardly be controverted, that the particles of a fluid are kept at a diſtance from each other, and from other bodies, by the corpuſcular forces. We ſhall therefore take this opportunity to give a view of the ſubject, which did not occur to us when treating of the motion of water in pipes, reſerving a further diſcuſſion to the articles River, *Water-Works*.

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How fluids [illegible]

The writers on hydrodynamics have always conſidered the obſtruction to the motion of fluids along canals of any kind, as owing to ſomething like the friction by which the motion of ſolid bodies on each other is obſtructed; but we cannot form to ourſelves any diſtinct notion of reſemblance, or even analogy between them. The fact is, however, that a fluid running along a canal has its motion obſtructed, and that this obſtruction is greateſt in the immediate vicinity of the ſolid canal, and gradually diminiſhes to the middle of the ſtream. It appears, therefore, that the parts of fluids can no more move among each other than among ſolid bodies, without ſuffering a diminution of their motion. The parts in phyſical contact with the ſides and bottom are retarded by theſe immoveable bodies. The particles of the next ſtratum of fluid cannot preſerve their initial velocities without overpaſſing the particles of the firſt ſtratum; and it appears from the fact that they are by this means retarded. They retard in the ſame manner the particles of the third ſtratum, and ſo on to the middle ſtratum or thread of fluid. It appears from the fact, therefore, that this ſort of friction is not a conſequence of rigidity alone, but that it is equally competent to fluids. Nay, ſince it is a matter of fact in air, and is even more remarkable there than in any other fluid, as we ſhall ſee by the experiments which have been made on the ſubject; and as our experiments on the compreſſion of air ſhow us the particles of air ten times nearer to each other in ſome caſes than in others (viz. when we ſee air a thouſand times denſer in theſe caſes), and therefore force us to acknowledge that they are not in contact; it is plain that this obſtruction has no analogy to friction, which ſuppoſes roughneſs or inequality of ſurface. No ſuch inequality can be ſuppoſed in the ſurface of an aerial particle; nor would it be of any ſervice in explaining the obſtruction, ſince the particles do not rub on each other, but paſs each other at ſome ſmall and imperceptible diſtance.

We muſt therefore have recourſe to ſome other mode of explication. We ſhall apply this to air only in this place; and, ſince it is proved by the incontrovertible experiments of Canton, Zimmerman, and others, that water, mercury, oil, &c. are alſo compreſſible and perfectly elaſtic, the argument from this principle, which is concluſive in air, muſt equally explain the ſimilar phenomenon in hydraulics.

The moſt highly poliſhed body which we know muſt be conceived as having an uneven ſurface when we compare it with the ſmall ſpaces in which the corpuſcular forces are exerted; and a quantity of air moving in a poliſhed pipe may be compared to a quantity of ſmall ſhot ſliding down a channel with undulated ſides and bottom. The row of particles immediately contiguous to the ſides will therefore have an undulated motion: but this undulation of the contiguous particles of air will not be ſo great as that of the ſurface along which they glide; for not only every motion requires force to produce it, but alſo every change of motion. The particles of air reſiſt this change from a rectilineal to an undulating motion; and, being elaſtic, that is, repelling each other and other bodies, they keep a little nearer to the ſurface as they are paſſing over an eminence, and their path is leſs incurvated than the ſurface. The difference between the motion of the particles of air and the particles of a fluid quite unelaſtic is, in this reſpect, ſomewhat like the difference between the motion of a ſpring-carriage and that of a common carriage. When the common carriage paſſes along a road not perfectly ſmooth, the line deſcribed by the centre of gravity of the carriage keeps perfectly parallel to that deſcribed by the axis of the wheels, riſing and falling along with it. Now let a ſpring body be put on the ſame wheels and paſs along the ſame road. When the axis riſes over an eminence perhaps half an inch, ſinks down again into the next hollow, and then riſes a ſecond time, and ſo on, the centre of gravity of the body deſcribes a much ſtraighter line; for upon the riſing of the wheels, the body reſiſts the motion, and compreſſes the ſprings, and thus remains lower than it would have been had the ſprings not been interpoſed. In like manner, it does not ſink ſo low as the axle does when the wheels go into a hollow. And thus the motion of ſpring-carriages becomes leſs violently undulated than the road along which they paſs. This illuſtration will, we hope, enable the reader to conceive how the deviation of the particles next to the ſides and bottom of the canal from a rectilineal motion is leſs than that of the canal itſelf.

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Particles of air reſiſt a change from a rectilineal to an undulating motion,

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and the undulation of the ſecond row of particles will be leſs than that of the firſt.
Fig. 83.

It is evident that the ſame reaſoning will prove that the undulation of the next row of particles will be leſs than that of the firſt, that the undulation of the third row will be leſs than that of the ſecond, and ſo on, as is repreſented in fig. 83. And thus it appears, that while the maſs of air has a progreſſive motion along the pipe or canal, each particle is deſcribing a waving line, of which a line parallel to the direction of the canal is the axis, cutting all theſe undulations. This axis of each undulated path will be ſtraight or curved as the canal is, and the excurſions of the path on each ſide of its axis will be leſs and leſs as the axis of the path is nearer to the axis of the canal.

299
Each particle appears to loſe no velocity.

Let us now ſee what *ſenſible* effect this will have; for all the motion which we here ſpeak of is imperceptible. It is demonſtrated in mechanics, that if a body moving with any velocity be deflected from its rectilineal path by a curved and perfectly ſmooth channel, to which the rectilineal path is a tangent, it will proceed along this channel with undiminiſhed velocity. Now the path, in the preſent caſe, may be conſidered as perfectly ſmooth, ſince the particles do not touch it. It is one of the undulations which we are conſidering, and we may at preſent conceive this as without any ſubordinate inequalities. There ſhould not, therefore, be any diminution of the velocity. Let us grant this of the abſolute velocity of the particle; but what we obſerve is the velocity of the maſs, and we judge of it perhaps by the motion of a feather carried along by it. Let us ſuppoſe a ſingle atom to be a ſenſible object, and let us attend to two ſuch particles, one at the ſide, and the other in the middle: although we cannot perceive the undulations of theſe particles during their progreſſive motions, we ſee the progreſſive motions themſelves. Let us ſuppoſe then that the middle particle has moved without any undulation whatever, and that it has advanced ten feet. The lateral particle will alſo have moved ten feet; but this has not been in a ſtraight line. It will not be ſo far advanced, therefore, in the direction of the canal; it will be left behind, and will appear to us to have been retarded in its motion: and in like manner each thread of particles will be more and more retarded (apparently only) as it recedes farther from the axis of the canal, or what is uſually called the thread of the ſtream.

300
But on the whole the undulatory motion is a real obſtruction.

And thus the obſerved fact is ſhown to be a neceſſary conſequence of what we know to be the nature of a compreſſible or elaſtic fluid; and that without ſuppoſing any diminution in the real velocity of each particle, there will be a diminution of the velocity of the ſenſible threads of the general ſtream, and a diminution of the whole quantity of air which paſſes along it during a given time.

Let us now ſuppoſe a parcel of air impelled along a pipe, which is *perfectly* ſmooth, out of a larger veſſel, and iſſuing from this pipe with a certain velocity. It requires a certain force to change its velocity in the veſſel to the greater velocity which it has in the pipe. This is abundantly demonſtrated. How long ſoever we ſuppoſe this pipe, there will be no change in the velocity, or in the force to keep it up. But let us ſuppoſe that about the middle of this pipe there is a part of it which has ſuddenly got an undulated ſurface, however imperceptible. Let us further ſuppoſe that the final velocity of the middle thread is the ſame as before. In this caſe it is evident that the ſum total of the motions of all the particles is greater than before, becauſe the abſolute motions of the lateral particles is greater than that of the central particle, which we ſuppoſe the ſame as before. This abſolute increaſe of motion cannot be without an increaſe of propelling force: the force acting now, therefore, muſt be greater than the force acting formerly. Therefore, if only the former force had continued to act, the ſame motion of the central particle could not have been preſerved, or the progreſſive motion of the whole ſtream muſt be diminiſhed.

And thus we ſee that this internal inſenſible undulatory motion becomes a real obſtruction to the ſenſible motion which we obſerve, and occaſions an expence of power.

301
An additional force neceſſary for preſerving a given progreſſive motion,

Let us ſee what will be the conſequence of extending this obſtructing ſurface further along the canal. It muſt evidently be accompanied by an augmentation of the motion produced, if the central velocity be ſtill kept up; for the particles which are now in contact with the ſides do not continue to occupy that ſituation: the middle particles moving faſter *forward* get over them, and in their turn come next the ſide; and as they are really moving equally faſt, but not in the direction into which they are now to be forced, force is neceſſary for changing the direction alſo; and this is in addition

Air in Motion.

addition to the force neceſſary for producing the undulations ſo minutely treated of. The conſequence of this muſt be, that an additional force will be neceſſary for preſerving a given progreſſive motion in a longer *obſtructing* pipe, and that the motion produced in a pipe of greater length by a given force will be leſs than in a ſhorter one, and the efflux will be diminiſhed.

302 eſpecially through any contraction.

There is another conſideration which muſt have an influence here. Nothing is more irrefragably demonſtrated than the neceſſity of an additional force for producing an efflux through any contraction, even though it ſhould be ſucceeded by a dilatation of the paſſage. Now both the inequalities of the ſides and the undulations of the motions of each particle are equivalent to a ſucceſſion of contractions and dilatations; although each of theſe is next to infinitely ſmall; their number is alſo next to infinitely great, and therefore the total effect may be ſenſible.

303 There are beſides other obſtructions, as angular aſperities, &c.

We have hitherto ſuppoſed that the abſolute velocity of the particles was not diminiſhed: this we did, having aſſumed that the interval of each undulation of the ſides was without inequalities. But this was gratuitous: it was alſo gratuitous that the ſides were only undulated. We have no reaſon for excluding angular aſperities. Theſe will produce, and moſt certainly often produce, real diminutions in the velocity of the contiguous particles; and this muſt extend to the very axis of the canal, and produce a diminution of the ſum total of motion: and in order to preſerve the ſame ſenſible progreſſive motion, a greater force muſt be employed. This is all that can be meant by ſaying that there is a reſiſtance to the motion of air through long pipes.

304 and a want of perfect fluidity.

There remains another cauſe of diminution, viz. the want of perfect fluidity, whether ariſing from the diſſemination of ſolid particles in a real fluid, or from the viſcidity of the fluid. We ſhall not inſiſt on this at preſent, becauſe it cannot be ſhown to obtain in air, at leaſt in any caſe which deſerves conſideration. It ſeems of no importance to determine the motion of air hurrying along with it ſoot or duſt. The effect of fogs on a particular modification of the motion of air will be conſidered under the article SOUND. What has been ſaid on this ſubject is ſufficient for our purpoſe, as explaining the prodigious and unexpected obſtruction to the paſſage of air through long and narrow pipes. We are able to collect an important maxim from it, viz. that all pipes of communication ſhould be made as wide as circumſtances will permit; for it is plain that the obſtruction depends on the internal ſurface, and the force to overcome it muſt be in proportion to the maſs of matter which is in motion. The firſt increaſes as the diameter of the pipe, and the laſt as the ſquare. The obſtruction muſt therefore bear a greater proportion to the whole motion in a ſmall pipe than in a large one.

305 The law of retardation extending from the axis to the ſides of the canal unknown.

It were very deſirable to know the law by which the retardation extends from the axis to the ſides of the canal, and the proportion which ſubſiſts between the lengths of the canal and the forces neceſſary for overcoming the obſtructions when the velocity is given; as alſo whether the proportion of the obſtruction to the whole motion varies with the velocity: but all this is unknown. It does not, however, ſeem a deſperate caſe in air: we know pretty diſtinctly the law of action among its particles, viz. that their mutual repulſions are inverſely as their diſtances. This renders it poſſible to trace the progreſs of undulation from the ſides of the canal to the axis.

306 It will not increaſe ſo faſt as the ſquare of the velocity.

We can ſee that the retardations will not increaſe ſo faſt as the ſquare of the velocity. Were the fluid incompreſſible, ſo that the undulatory path of a particle were invariable, the deflecting forces by which each individual particle is made to deſcribe its undulating path would be preciſely ſuch as ariſe from the path itſelf and the motion in it; for each particle would be in the ſituation of a body moving along a fixed path. But in a very compreſſible fluid, ſuch as air, each particle may be conſidered as a ſolitary body, actuated by a projectile and a tranſverſe force, ariſing from the action of the adjoining particles. Its motion muſt depend on the adjuſtment of theſe forces, in the ſame manner as the elliptical motion of a planet depends on the adjuſtment of the force of projection, with a gravitation inverſely proportional to the ſquare of the diſtance from the focus. The tranſverſe force in the preſent caſe has its origin in the preſſure on the air which is propelling it along the pipe: this, by ſqueezing the particles together, brings their mutual repulſion into action. Now it is the property of a perfect fluid, that a preſſure exerted on any part of it is propagated equally through the whole fluid; therefore the tranſverſe forces which are excited by this preſſure are proportional to the preſſure itſelf; and we know that the preſſures exerted on the ſurface of a fluid, ſo as to expel it through any orifice, or along any canal, are proportional to the ſquares of the velocities which they produce. Therefore, in every point of the undulatory motion of any particle, the tranſverſe force by which it is deflected into a curve is proportional to the ſquare of its velocity. When this is the caſe, a body would continue to deſcribe the ſame curve as before; but, by the very compreſſion, the curvatures are increaſed, ſuppoſing them to remain ſimilar. This would require an increaſe of the tranſverſe forces; but this is not to be found: therefore the particle will not deſcribe a ſimilar curve, but one which is leſs incurvated in all its parts; conſequently the progreſſive velocity of the whole, which is the only thing perceivable by us, will not be ſo much diminiſhed; that is, the obſtructions will not increaſe ſo faſt as they would otherwiſe do, or as the ſquares of the velocities.

This reaſoning is equally applicable to all fluids, and is abundantly confirmed by experiments in hydraulics, as we ſhall ſee when conſidering the motion of rivers. We have taken this opportunity of delivering our notions on this ſubject; becauſe, as we have often ſaid, it is in the avowed diſcrete conſtitution of air that we ſee moſt diſtinctly the operation of thoſe natural powers which conſtitute fluidity in general.

307 M. Boſſut's experiments on pipes and canals.

We would beg leave to mention a form of experiment for diſcovering the law of retardation with conſiderable accuracy. Experiments have been made on pipes and canals. Mr Boſſut, in his *Hydrodynamique*, has given a very beautiful ſet made on pipes of an inch and two inches diameter, and 200 feet long: but although theſe experiments are very inſtructive, they do not give us any rule by which we can extend the reſult to pipes of greater length and different diameters.

Let a ſmooth cylinder be ſet upright in a very large veſſel or pond, and be moveable round its axis: let it be turned round by means of a wheel and pulley with an uniform motion and determined velocity. It will exert the ſame force on the contiguous water which would be exerted on it by water turning round it with the ſame velocity: and as this water would have its motion gradually retarded by the fixed cylinder, ſo the moving cylinder will gradually communicate motion to the ſurrounding water. We ſhould obſerve the water gradually dragged round by it; and the vortex would extend farther and farther from it as the motion is continued, and the velocities of the parts of the vortex will be leſs and leſs as we recede from the axis. Now, we apprehend, that when a point of the ſurface of the cylinder has moved over 200 feet, the *motion* of the water at different diſtances from it will be ſimilar and proportional to, if not preciſely the ſame with, the *retardations* of water flowing 200 feet at the ſame diſtance from the ſide of a canal: at any rate, the two are ſuſceptible of an accurate compariſon, and the law of retardation may be accurately deduced from obſervations made on the motions of this vortex.

308 Wind is air in motion.

Air in motion is a very familiar object of obſervation; and it is intereſting. In all languages it has got a name; we call it wind: and it is only upon reflection that we conſider air as wind in a quieſcent ſtate. Many perſons hardly know what is meant when air is mentioned; but they cannot refuſe that the blaſt from a bellows is the expulſion of what they contained; and thus they learn that wind is air in motion.

309 The velocity of wind not eaſily diſcovered.

It is of conſequence to know the velocity of wind; but no good and unexceptionable method has been contrived for this purpoſe. The beſt ſeems to be by meaſuring the ſpace paſſed over by the ſhadow of a cloud; but this is extremely fallacious. In the firſt place, it is certain, that although we ſuppoſe that the cloud has the velocity of the air in which it is carried along, this is not an exact meaſure of the current on the ſurface of the earth; we may be almoſt certain that it is greater: for air, like all other fluids, is retarded by the ſides and bottom of the channel in which it moves. But, in the next place, it is very gratuitous to ſuppoſe, that the velocity of the cloud is the velocity of the ſtratum of air between the cloud and the earth; we are almoſt certain that it is not. It is abundantly proved by Dr Hutton of Edinburgh, that clouds are always formed when two parcels of air of different temperatures mix together, each containing a proper quantity of vapour in the ſtate of chemical ſolution. We know that different ſtrata of air will frequently flow in different directions for a long time. In 1781 while a great fleet rendezvouzed in Leith Roads during the Dutch war, there was a briſk eaſterly wind for about five weeks; and, during the laſt fortnight of this period, there was a briſk weſterly current at the height of about three-fourths of a mile. This was diſtinctly indicated by frequent fleecy clouds at a great diſtance above a lower ſtratum of theſe clouds, which were driving all this time from the eaſtward. A gentleman who was at the ſiege of Quebec in 1759, informed us, that one day while there blew a gale from the weſt, ſo hard that the ſhips at anchor in the river were obliged to ſtrike their topmaſts, and it was with the utmoſt difficulty that ſome well manned boats could row againſt it, carrying ſome artillery ſtores to a poſt above the town, ſeveral ſhells were thrown from the town to deſtroy the boats: one of the ſhells burſt in the air near the top of its flight, which was about half a mile high. The ſmoke of this bomb remained in the ſame ſpot for above a quarter of an hour, like a great round ball, and gradually diſſipated by diffuſion, without removing many yards from its place. When, therefore, two ſtrata of air come from different quarters, and one of them flows over the other, it will be only in the contiguous ſurfaces that a precipitation of vapour will be made. This will form a thin fleecy cloud; and it will have a velocity and direction which neither belongs to the upper nor to the lower ſtratum of air which produced it. Should one of theſe ſtrata come from the eaſt and the other from the weſt with equal velocities, the cloud formed between them will have no motion at all; ſhould one come from the eaſt, and the other from the north, the cloud will move from the north-eaſt with a greater velocity than either of the ſtrata. So uncertain then is the information given by the clouds either of the velocity or the direction of the wind. A thick ſmoke from a furnace will give us a much leſs equivocal meaſure; and this, combined with the effects of the wind in impelling bodies, or deflecting a loaded plane from the perpendicular, or other effects of this kind, may give us meaſures of the different currents of wind with a preciſion ſufficient for all practical uſes.

310 The reſult of Smeaton's obſervation on this head.

The celebrated engineer Mr John Smeaton has given, in the 51ſt volume of the Philoſophical Tranſactions, the velocities of wind correſponding to the uſual denominations in our language. Theſe are founded on a great number of obſervations made by himſelf in the courſe of his practice in erecting wind-mills. They are contained in the following table.

Miles per hour.	Feet per ſecond.	Names.
1	1.47	
2	2.93	Light airs.
3	4.40	
4	5.87	Breeze.
5	7.33	
10	14.67	Briſk gale.
15	22.	
20	29.34	Freſh gale.
25	36.67	
30	44.01	Strong gale.
35	51.34	
40	58.68	Hard gale.
45	66.01	
50	73.35	Storm.
60	88.02	
80	117.36	Hurricane, tearing up trees, overturning buildings, &c.
100	146.70	

See alſo ſome valuable experiments by him on this ſubject, Philoſophical Tranſactions 1760 and 1761.

311 Account of Dr Lind's anemometer.

One of the moſt ingenious and convenient methods for meaſuring the velocity of the wind is to employ its preſſure in ſupporting a column of water, in the ſame way as Mr Pitot meaſures the velocity of a current of water. We believe that it was firſt propoſed by Dr James Lind of Windſor, a gentleman eminent for his great knowledge in all the branches of natural ſcience, and for his ingenuity in every matter of experiment or practical application.

Fig. 84.

His anemometer (as theſe inſtruments are called) conſiſts

Velocity of Wind.

ſiſts of a glaſs tube of the form ABCD (fig. 84.), open at both ends, and having the branch AB at right angles to the branch CD. This tube contains a few inches of water or any fluid (the lighter the better): it is held with the part CD upright, and AB horizontal and in the direction of the wind; that is, with the mouth A fronting the wind. The wind acts in the way of preſſure on the air in AB, compreſſes it, and cauſes it to preſs on the ſurface of the liquor; forcing it down to F, while it riſes to E in the other leg. The velocity of the wind is concluded from the difference E*f* between the heights of the liquor in the legs. As the wind does not generally blow with uniform velocity, the liquor is apt to dance in the tube, and render the obſervation difficult and uncertain: to remedy this, it is proper to contract very much the communication at C between the two legs. If the tube has half an inch of diameter (and it ſhould not have leſs), a hole of [illegible] of an inch is large enough; indeed the hole can hardly be too ſmall, nor the tubes too large.

312
It is ingenious and uſeful.

This inſtrument is extremely ingenious, and will undoubtedly give the proportions of the velocities of different currents with the greateſt preciſion; for in whatever way the preſſure of wind is produced by its motion, we are certain that the different preſſures are as the ſquares of the velocities: if, therefore, we can obtain one certain meaſure of the velocity of the wind, and obſerve the degree to which the preſſure produced by it raiſes the liquor, we can at all other times obſerve the preſſures and compute the velocities from them, making proper allowances for the temperature and the height of the mercury in the barometer; becauſe the velocity will be in the ſubduplicate ratio of the denſity of the air inverſely when the preſſure is the ſame.

It is uſually concluded, that the velocity of the wind is that which would be acquired by falling through a height which is to E*f* as the weight of water is to that of an equal bulk of air. Thus, ſuppoſing air to be 840 times lighter than water, and that E*f* is $\frac{9}{10}$ of an inch, the velocity will be about 63 feet per ſecond, which is that of a very hard gale, approaching to a ſtorm. Hence we ſee by the bye, that the ſcale of this inſtrument is extremely ſhort, and that it would be a great improvement of it to make the leg CD not perpendicular, but very much ſloping; or perhaps the following form of the inſtrument will give it all the perfection of which it is capable. Let the horizontal branch AB (fig. 85.) be contracted at B, and continued horizontally for ſeveral inches BG of a much ſmaller bore, and then turned down for two or three inches GC, and then upwards with a wide bore. To uſe the inſtrument, hold it with the part DC perpendicular; and (having ſheltered the mouth A from the wind) pour in water at D till it advances along GB to the point B, which is made the beginning of the ſcale; the water in the upright branch ſtanding at *f* in the ſame horizontal line with BG. Now, turn the mouth A to the wind; the air in AB will be compreſſed and will force the water along BG to F, and cauſe it to riſe from *f* to E; and the range *f*E will be to the range BF on the ſcale as the ſection of the tube BG to that of CD. Thus, if the width of DC be $\frac{1}{2}$ an inch, and that of BG $\frac{1}{10}$, we ſhall have 25 inches in the ſcale for one inch of real preſſure E*f*.

Fig. 85.

But it has not been demonſtrated in a very ſatisfactory manner, that the velocity of the wind is that acquired by falling through the height of a column of air whoſe weight is equal to that of the column of water E*f*. Experiments made with Pitot's tube in currents of water ſhow that ſeveral corrections are neceſſary for concluding the velocity of the current from the elevations in the tube; theſe corrections may however be made, and fairly applied to the preſent caſe, and then the inſtrument will enable us to conclude the velocity of the wind immediately, without any fundamental compariſon of the elevations with a velocity otherwiſe determined upon other principles. The chief uſe which we have for this information is in our employment of wind as an impelling power, by which we can actuate machinery or navigate ſhips. Theſe are very important applications of pneumatical doctrines, and merit a particular conſideration; and this naturally brings us to the laſt part of our ſubject, viz. the conſideration of the impulſe of air on bodies expoſed to its action, and the reſiſtance which it oppoſes to the paſſage of bodies through it.

313
The ſubject is moſt important, but it is alſo difficult.

This is a ſubject of the greateſt importance; being the foundation of that art which has done the greateſt honour to the ingenuity of man, and the greateſt ſervice to human ſociety, by connecting together the moſt diſtant inhabitants of this globe, and making a communication of benefits which would otherwiſe have been impoſſible; we mean the art of Navigation or Seamanſhip. Of all the machines which human art has conſtructed, a ſhip is not only the greateſt and moſt magnificent, but alſo the moſt ingenious and intricate; and the clever ſeaman poſſeſſes a knowledge founded on the moſt difficult and abſtruſe doctrines of mechanics. The ſeaman probably cannot give any account of his own ſcience; and he poſſeſſes it rather by a kind of intuition than by any proceſs of reaſoning; but the ſucceſs and efficacy of all the mechaniſm of this complicated engine, and the propriety of all the manœuvres which the ſeaman practiſes, depend on the invariable laws of mechanics; and a thorough knowledge of theſe would enable an intelligent perſon not only to underſtand the machine and the manner of working it, but to improve both.

Unfortunately this is a ſubject of very great difficulty; and although it has employed the genius of Newton, and he has conſidered it with great care, and his followers have added more to his labours on this ſubject than on any other, it ſtill remains in a very imperfect ſtate.

A minute diſcuſſion of this ſubject cannot therefore be expected in a work like this: we muſt content ourſelves with ſuch a general ſtatement of the moſt approved doctrine on the ſubject as ſhall enable our readers to conceive it diſtinctly, and judge with intelligence and confidence of the practical deductions which may be made from it.

314
Impulſe and Reſiſtance of air.

It is evidently a branch of the general theory of the impulſe and reſiſtance of fluids, which belongs to HYDRAULICS, but will be better underſtood when the mechanical properties of compreſſible fluids have been conſidered. It was thought very reaſonable to ſuppoſe that the circumſtances of elaſticity would introduce the ſame changes in the impulſe and reſiſtance of fluids that it does in ſolid bodies. It would greatly divert the attention from the diſtinctive properties of air, if we ſhould in this place enter on this ſubject, which is both extenſive and difficult. We reckon it better therefore to take the whole together; this we ſhall do under the article

RESISTANCE of Fluids, and confine ourſelves at preſent to what relates to the impulſe and reſiſtance of air alone; anticipating a few of the general propoſitions of that theory, but without demonſtration, in order to underſtand the applications which may be made of it.

Fig. 86.

Suppoſe then a plane ſurface, of which *a*C (fig. 86.) is the ſection, expoſed to the action of a ſtream of wind blowing in the direction QC, perpendicular to *a* C. The motion of the wind will be obſtructed, and the ſurface *a* C preſſed forward. And as all impulſe or preſſure is exerted in a direction perpendicular to the ſurface, and is reſiſted in the oppoſite direction, the ſurface will be impelled in the direction CD, the continuation of QC. And as the mutual actions of bodies depend on their relative motions, the force acting on the ſurface *a* C will be the ſame, if we ſhall ſuppoſe the air at reſt, and the ſurface moving equally ſwift in the oppoſite direction. The reſiſtance of the air to the motion of the body will be equal to the impulſe of the air in the former caſe. Thus reſiſtance and impulſe are equal and contrary.

315
Air moving with a double velocity will generally impel as the ſquare of that velocity.

If the air be moving twice as faſt, its particles will give a double impulſe; but in this caſe a double number of particles will exert their impulſe in the ſame time: the impulſe will therefore be fourfold; and in general it will be as the ſquare of the velocity: or if the air and body be both in motion, the impulſe and reſiſtance will be proportional to the ſquare of the relative velocity.

This is the firſt propoſition on the ſubject, and it appears very conſonant to reaſon. There will therefore be ſome analogy between the force of the air's impulſe or the reſiſtance of a body, and the weight of a column of air incumbent on the ſurface; for it is a principle in the action of fluids, that the heights of the columns of fluid are as the ſquares of the velocities which their preſſures produce. Accordingly the ſecond propoſition is, that the abſolute impulſe of a ſtream of air, blowing perpendicularly on any ſurface, is equal to the weight of a column of air which has that ſurface for its baſe, and for its height the ſpace through which a body muſt fall in order to acquire the velocity of the air.

Thirdly, Suppoſe the ſurface AC equal to *a* C no longer to be perpendicular to the ſtream of air, but inclined to it in the angle ACD, which we ſhall call the *angle of incidence;* then, by the reſolution of forces, it follows, that the action of each particle is diminiſhed in the proportion of radius to the ſine of the angle of incidence, or of AC to AL, AL being perpendicular to CD.

Again: Draw AK parallel to CD. It is plain that no air lying farther from CD than KA is will ſtrike the plane. The quantity of impulſe therefore is diminiſhed ſtill farther in the proportion of *a* C to KC, or of AC to AL. Therefore, on the whole, the abſolute impulſe is diminiſhed in the proportion of AC^2 to AL^2: hence the propoſition, that the impulſe and reſiſtance of a given ſurface are in the proportion of the ſquare of the ſine of the angle of incidence.

Fourthly, This impulſe is in the direction PL, perpendicular to the impelled ſurface, and the ſurface tends to move in this direction: but ſuppoſe it moveable only in ſome other direction PO, or that it is in the direction PO that we wiſh to employ this impulſe, its action is therefore oblique; and if we wiſh to know the intenſity of the impulſe in this direction, it muſt be diminiſhed ſtill farther in the proportion of radius to the coſine of the angle LPO or ſine of CPO. Hence the general propoſition: The *effective impulſe is as the ſurface, as the ſquare of the velocity of the wind, as the ſquare of the ſine of the angle of incidence, and as the ſine of the obliquity jointly*, which we may expreſs by the ſymbol $R = S\cdot V^{2}\cdot$ *ſin.*$^{2}\cdot$ I· *ſin.* O; and as the impulſe depends on the denſity of the impelling fluid, we may take in every circumſtance by the equation $R=S\cdot D\cdot V^{2}\cdot$ *ſin.*^{2} I· *ſin.* O. If the impulſe be eſtimated in the direction of the ſtream, the angle of obliquity ACD is the ſame with the angle of incidence, and the impulſe in this direction is as the ſurface, as the ſquare of the velocity, and as the cube of the angle of incidence jointly.

It evidently follows from theſe premiſes, that if ACA′ be a wedge, of which the baſe AA′ is perpendicular to the wind, and the angle ACA′ biſected by its direction, the direct or perpendicular impulſe on the baſe is to the oblique impulſe on the ſides as radius to the ſquare of the ſine of half the angle ACA′.

The ſame muſt be affirmed of a pyramid or cone ACA′, of which the axis is in the direction of the wind.

Fig. 87.

If ACA′ (fig. 87.) repreſent the ſection of a ſolid, produced by the revolution of a curve line APC round the axis CD, which lies in the direction of the wind, the impulſe on this body may be compared with the direct impulſe on this baſe, or the reſiſtance to the motion of this body through the air may be compared with the direct reſiſtance of its baſe, by reſolving its ſurface into elementary planes P*p*, which are coincident with a tangent plane PR, and comparing the impulſe on P*p* with the direct impulſe on the correſponding part K*k* of the baſe.

In this way it follows that the impulſe on a ſphere is one half of the impulſe on its great circle, or on the baſe of a cylinder of equal diameter.

We ſhall conclude this ſketch of the doctrine with a very important propoſition to determine the moſt advantageous poſition of a plane ſurface, when required to move in one direction while it is impelled by the wind blowing in a different direction. Thus,

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Important inference from this doctrine.

Let AB (fig. 88.) be the ſail of a ſhip, CA the direction in which the wind blows, and AD the line of the ſhip's courſe. It is required to place the yard AC in ſuch a poſition that the impulſe of the wind upon the ſail may have the greateſt effect poſſible in impelling the ſhip along AD.

Fig. 88.

Let AB, A*b*, be two poſitions of the ſail very near the beſt poſition, but on oppoſite ſides of it. Draw BE, *b e*, perpendicular to CA, and BF, *b f*, perpendicular to AD, calling AB radius; it is evident that BE, BF, are the ſines of impulſe and obliquity, and that the effective impulſe is $BE^2\times BF$, or $be^2\times bf$. This muſt be a maximum.

Let the points B, *b*, continually approach and ultimately coincide; the chord *b* B will ultimately coincide with a ſtraight line CBD touching the circle in B; the triangles CBE, *c b e* are ſimilar, as alſo the triangles DBF, D*bf*: therefore $BE^2 : be^2 = BC^2 : bc^2$, and $BF : bf = BD : bD$; and $BE^2\times BF : be^2\times bf = Cb^2\times BD : cb^2\times bD$. Therefore when AB is in the beſt poſition, ſo that $BE^2\times BF$ is greater than $be^2\times bf$, we ſhall have $CB\times BD$ greater than $Cb^2\times bD$, or $cB^2\times BD$

is

Velocity of Wind. is alſo a maximum. This we know to be the caſe when CB=2BD: therefore the ſail muſt be ſo placed that the tangent of the angle of incidence ſhall be double of the tangent of the angle of the ſail and keel.

In a common windmill the angle CAD is neceſſarily a right angle; for the ſail moves in a circle to which the wind is perpendicular: therefore the beſt angle of the ſail and axle will be 54°.44 nearly.

Such is the theory of the reſiſtance and impulſe of the air. It is extremely ſimple and of eaſy application. In all phyſical theories there are aſſumptions which depend on other principles, and thoſe on the judgement of the naturaliſt; ſo that it is always proper to confront the theory with experiment. There are even circumſtances in the preſent caſe which have not been attended to in the theory. When a ſtream of air is obſtructed by a ſolid body, or when a ſolid body moves along in air, the air is condenſed before it and rarefied behind. There is therefore a preſſure on the anterior parts ariſing from this want of equilibrium in the elaſticity of the air. This muſt be ſuperadded to the force ariſing from the impetus or inertia of the air. We cannot tell with preciſion what may be the amount of this condenſation; it depends on the velocity with which any condenſation diffuſes itſelf.

Alſo, if the motion be ſo rapid that the preſſure of the atmoſphere cannot make the air immediately occupy the place quitted by the body, it will ſuſtain this preſſure on its fore part to be added to the other forces.

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Account of
e princi-
al experi-
ents on
is ſub-
ct.

Experiments on this ſubject are by no means numerous; at leaſt ſuch experiments as can be depended on for the foundation of any practical application. The firſt that have this character are thoſe publiſhed by Mr Robins in 1742 in his treatiſe on Gunnery. They were repeated with ſome additions by the Chevalier Borda, and ſome account of them publiſhed in the Memoirs of the Academy of Sciences in 1763. In the Philoſophical Tranſactions of the Royal Society of London, vol. lxxiii. there are ſome experiments of the ſame kind on a larger ſcale by Mr Edgeworth. Theſe were all made in the way deſcribed in our account of Mr Robins's improvements in gunnery. Bodies were made to move with determined velocities, and the reſiſtances were meaſured by weights.

In all theſe experiments the reſiſtances were found very exactly in the proportion of the ſquares of the velocities; but they were found conſiderably greater than the weight of the column of air, whoſe height would produce the velocity in a falling body. Mr Robins's experiments on a ſquare of 16 inches, deſcribing 25.2 feet per ſecond, indicate the reſiſtance to be to this weight nearly as 4 to 3. Borda's experiments on the ſame ſurface ſtate the diſproportion ſtill greater.

The reſiſtances are found not to be in the proportion of the ſurfaces, but increaſe conſiderably faſter. Surfaces of 9, 16, 36, and 81 inches, moving with one velocity, had reſiſtances in the proportion of 9, 17$\frac{1}{2}$, 42$\frac{1}{3}$, and 104$\frac{1}{4}$.

Now as this deviation from the proportion of the ſurfaces increaſes with great regularity, it is moſt probable that it continues to increaſe in ſurfaces of ſtill greater extent; and theſe are the moſt generally to be met with in practice in the action of wind on ſhips and mills.

Borda's experiments on 81 inches ſhow that the impulſe of wind moving one foot per ſecond is about [illegible] of a pound on a ſquare foot. Therefore to find the impulſe on a foot corresponding to any velocity, divide the ſquare of the velocity by [illegible], and we obtain the impulſe in pounds. Mr Rouſe of Leverton made many experiments, which are mentioned with great approbation by Mr Smeaton. His great ſagacity and experience in the erection of windmills oblige us to pay a conſiderable deference to his judgement. Theſe experiments confirm our opinion, that the impulſes increaſe faſter than the ſurfaces. The following table was calculated from Mr Rouſe's obſervations, and may be conſidered as pretty near the truth.

Velocity in feet.	Impulſe on a Foot in Pounds.
5	0,057
10	0,229
20	0,915
30	2,059
40	3,660
50	5,718
60	8,234
70	11,2[illegible]7
80	14,638
90	18,526
100	22,872
110	27,675
120	32,926
130	38,654
140	44,830
150	51,462

If we multiply the ſquare of the velocity in feet by 16, the product will be the impulſe or reſiſtance on a ſquare foot in grains, according to Mr Rouſe's numbers.

The greateſt deviation from the theory occurs in the oblique impulſes. Mr Robins compared the reſiſtance of a wedge, whoſe angle was 90°, with the reſiſtance of its baſe; and inſtead of finding it leſs in the proportion of $\sqrt{2}$ to 1, as determined by the theory, he found it greater in the proportion of 55 to 68 nearly; and when he formed the body into a pyramid, of which the ſides had the ſame ſurface and the ſame inclination as the ſides of the wedge, the reſiſtance of the baſe and face were now as 55 to 39 nearly: ſo that here the ſame ſurface with the ſame inclination had its reſiſtance reduced from 68 to 39 by being put into this form. Similar deviations occur in the experiments of the Chevalier Borda; and it may be collected from both, that the reſiſtances diminiſh more nearly in the proportion of the ſines of incidence than in the proportion of the ſquares of thoſe ſines.

The irregularity in the reſiſtance of curved ſurfaces is as great as in plane ſurfaces. In general, the theory gives the oblique impulſes on plane ſurfaces much too ſmall, and the impulſes on curved ſurfaces too great. The reſiſtance of a ſphere does not exceed the fourth part of the reſiſtance of its great circle, inſtead of being its half; but the anomaly is ſuch as to leave hardly any room for calculation. It would be very deſirable to have the experiments on this ſubject repeated in a greater variety of caſes, and on larger ſurfaces, ſo that the errors of the experiments may be of leſs conſequence.

Till this matter be reduced to ſome rule, the art of working ſhips muſt remain very imperfect, as muſt alſo the conſtruction of windmills.

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It is of great conſequence to know the reſiſtance of air in the motion of bullets, &c.

The caſe in which we are moſt intereſted in the knowledge of the reſiſtance of the air is the motion of bullets and ſhells. Writers on artillery have long been ſenſible of the great effect of the air's reſiſtance. It ſeems to have been this conſideration that chiefly engaged Sir Iſaac Newton to conſider the motions of bodies in a reſiſting medium. A propoſition or two would have ſufficed for ſhowing the incompatibility of the planetary motions with the ſuppoſition that the celeſtial ſpaces were filled with a fluid matter; but he has with great ſolicitude conſidered the motion of a body projected on the ſurface of the earth, and its deviation from the parabolic track aſſigned by Galileo. He has beſtowed more pains on this problem than any other in his whole work; and his inveſtigation has pointed out almoſt all the improvements which have been made in the application of mathematical knowledge to the ſtudy of nature. Nowhere does his ſagacity and fertility of reſource appear in ſo ſtrong a light as in the ſecond book of the *Principia*, which is almoſt wholly occupied by this problem. The celebrated mathematician John Bernouilli engaged in it as the fineſt opportunity of diſplaying his ſuperiority. A miſtake committed by Newton in his attempt to a ſolution was matter of triumph to him; and the whole of his performance, though a piece of elegant and elaborate geometry, is greatly hurt by his continually bringing this miſtake (which is a mere trifle) into view. The difficulty of the ſubject is ſo great, that ſubſequent mathematicians ſeem to have kept aloof from it; and it has been entirely overlooked by the many voluminous writers who have treated profeſſedly on military projectiles. They have ſpoken indeed of the reſiſtance of the air as affecting the flight of ſhot, but have ſaved themſelves from the taſk of inveſtigating this effect (a taſk to which they were unequal), by ſuppoſing that it was not ſo great as to render their theories and practical deductions very erroneous. Mr Robins was the firſt who ſeriouſly examined the ſubject. He ſhowed, that even the Newtonian theory (which had been corrected, but not in the ſmalleſt degree improved or extended in its principles) was ſufficient to ſhow that the path of a cannon ball could not reſemble a parabola. Even this theory ſhowed that the reſiſtance was more than eight times the weight of the ball, and ſhould produce a greater deviation from the parabola than the parabola deviated from a ſtraight line.

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The ignorance of the writers on artillery in this reſpect.

This ſimple but ſingular obſervation was a ſtrong proof how faulty the profeſſed writers on artillery had been, in rather amuſing themſelves with elegant but uſeleſs applications of eaſy geometry, than in endeavouring to give their readers any uſeful information. He added, that the difference between the ranges by the Newtonian theory and by experiment was ſo great, that the reſiſtance of the air muſt be vaſtly ſuperior to what that theory ſuppoſed. It was this which ſuggeſted to him the neceſſity of experiments to aſcertain this point. We have ſeen the reſult of theſe experiments in moderate velocities; and that they were ſufficient for calling the whole theory in queſtion, or at leaſt for rendering it uſeleſs. It became neceſſary therefore to ſettle every point by means of a direct experiment. Here was a great difficulty. How ſhall we meaſure either theſe great velocities which are obſerved in the motions of cannon-ſhot, or the reſiſtances which theſe enormous velocities occaſion? Mr Robins had the ingenuity to do both. The method which he took for meaſuring the velocity of a muſket-ball was quite original; and it was ſuſceptible of great accuracy. We have already given an account of it under the article GUNNERY. Having gained this point, the other was not difficult. In the moderate velocities he had determined the reſiſtances by the forces which balanced them, the weights which kept the reſiſted body in a ſtate of uniform motion. In the great velocities, he propoſed to determine the reſiſtances by their immediate effects, by the retardations which they occaſioned. This was to be done by firſt aſcertaining the velocity of the ball, and then meaſuring its velocity after it had paſſed through a certain quantity of air. The difference of theſe velocities is the retardation, and the proper meaſure of the reſiſtance; for, by the initial and final velocities of the ball, we learn the time which was employed in paſſing through this air with the medium velocity. In this time the air's reſiſtance diminiſhed the velocity by a certain quantity. Compare this with the velocity which a body projected directly upwards would loſe in the ſame time by the reſiſtance of gravity. The two forces muſt be in the proportion of their effects. Thus we learn the proportion of the reſiſtance of the air to the weight of the ball. It is indeed true, that the time of paſſing through this ſpace is not accurately had by taking the arithmetical medium of the initial and final velocities, nor does the reſiſtance deduced from this calculation accurately correſpond to this mean velocity; but both may be accurately found by the experiment by a very troubleſome computation, as is ſhown in the 5th and 6th propoſitions of the ſecond book of Newton's *Principia*. The difference between the quantities thus found and thoſe deduced from the ſimple proceſs is quite trifling, and far within the limits of accuracy attainable in experiments of this kind; it may therefore be ſafely neglected.

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Mr Robins made many experiments on this ſubject.

Mr Robins made many experiments on this ſubject; but unfortunately he has publiſhed only a very few, ſuch as were ſufficient for aſcertaining the point he had in view. He intended a regular work on the ſubject, in which the gradual variations of reſiſtance correſponding to different velocities ſhould all be determined by experiment: but he was then newly engaged in an important and laborious employment, as chief engineer to the Eaſt India Company, in whoſe ſervice he went out to India, where he died in leſs than two years. It is to be regretted that no perſon has proſecuted theſe experiments. It would be neither laborious nor difficult, and would add more to the improvement of artillery than any thing that has been done ſince Mr Robins's death, if we except the proſecution of his experiments on the initial velocities of cannon-ſhot by Dr Charles Hutton royal profeſſor at the Woolwich Academy. It is to be hoped that this gentleman, after having with ſuch effect and ſucceſs extended Mr Robins's experiments on the initial velocities of muſket-ſhot to cannon, will take up this other ſubject, and thus give the art of artillery all the ſcientific foundation which it can receive in the preſent ſtate of our mathematical knowledge. Till then we muſt content ourſelves with the practical rules which Robins has deduced from his own experiments. As he has not given us the mode of deduction, we muſt compare the reſults with experiment. He has indeed given a very extenſive compariſon with the numerous experiments made both in Britain and on the continent; and the agreement is very great. His learned commentator Euler has been at no pains to inveſtigate theſe rules, and has employed himſelf chiefly in detecting errors, moſt of which are ſuppoſed, becauſe he takes for a finiſhed work what Mr Robins only gives to the public as a haſty but uſeful ſketch of a new and very difficult branch of ſcience.

321 General reſult of them, &c.

The general reſult of Robins's experiments on the retardation of muſket-ſhot is, that although in moderate velocities the reſiſtance is ſo nearly in the duplicate proportion of the velocities that we cannot obſerve any deviation, yet in velocities exceeding 200 feet per ſecond the retardations increaſe faſter, and the deviation from this rate increaſes rapidly with the velocity. He aſcribes this to the cauſes already mentioned, viz. the condenſation of the air before the ball and to the rarefaction behind, in conſequence of the air not immediately occupying the ſpace left by the bullet. This increaſe is ſo great, that if the reſiſtance to a ball moving with the velocity of 1700 feet in a ſecond be computed on the ſuppoſition that the reſiſtance obſerved in moderate velocities is increaſed in the duplicate ratio of the velocity, it will be found hardly one-third part of its real quantity. He found, for inſtance, that a ball moving through 1670 feet in a ſecond loſt about 125 feet per ſecond of its velocity in paſſing through 50 feet of air. This it muſt have done in the $\frac{1}{32}$ of a ſecond, in which time it would have loſt one foot if projected directly upwards; from which it appears that the reſiſtance was about 125 times it's weight, and more than three times greater than if it had increaſed from the reſiſtance in ſmall velocities in the duplicate ratio of the velocities. He relates other experiments which ſhow ſimilar reſults.

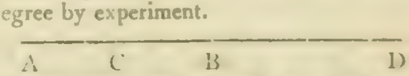
But he alſo mentions a ſingular circumſtance, that till the velocities exceed 1100 feet per ſecond, the reſiſtances increaſe pretty regularly, in a ratio exceeding the duplicate ratio of the velocities; but that in greater velocities the reſiſtances become ſuddenly triple of what they would have been, even according to this law of increaſe. He thinks this explicable by the vacuum which is then left behind the ball, it being well known that air ruſhes into a vacuum with the velocity of 1132 feet per ſecond nearly. Mr Euler controverts this concluſion, as inconſiſtent with that gradation which is obſerved in all the operations of nature; and ſays, that although the vacuum is not produced in ſmaller velocities than this, the air behind the ball muſt be ſo rare (the ſpace being but imperfectly filled), that the preſſure on the anterior part of the ball muſt gradually approximate to that preſſure which an abſolute vacuum would produce; but this is like his other criticiſms. Robins does nowhere aſſert that this ſudden change of reſiſtance happens in the tranſition of the velocity from 1132 feet to that of 1131 feet 11 inches or the like, but only that it is very ſudden and very great. It may be ſtrictly demonſtrated, that ſuch a change muſt happen in a narrow enough limit of velocities to juſtify the appellation of ſudden: a ſimilar fact may be obſerved in the motion of a ſolid through water. If it be gradually accelerated, the water will be found nearly to fill up its place, till the velocity arrives at a certain magnitude, correſponding to the immerſion of the body in the water; and then the ſmalleſt augmentation of its motion immediately produces a void behind it, into which the water ruſhes in a violent manner and is carried [illegible]. A gentleman, who has had many opportunities for ſuch obſervations, aſſures us, that when ſtanding near the line of direction of a cannon diſcharging a ball with a large allotment of powder, ſo that the initial velocity certainly exceeded 1100 feet per ſecond, he always obſerved a very ſudden diminution of the noiſe which the bullet made during its paſſage. Although the ball was coming towards him, and therefore its noiſe, if equable, would be continually increaſing, he obſerved that it was loudeſt at firſt. That this continued for a ſecond or two, and ſuddenly diminiſhed, changing to a ſound which was not only weaker, but differed in kind, and gradually increaſed as the bullet approached him. He ſaid, that the firſt noiſe was like the hiſſing of red-hot iron in water, and that the ſubſequent noiſe rather reſembled a hazy whiſtling. Such a change of ſound is a neceſſary conſequence of the different agitation of the air in the two caſes. We know alſo, that air ruſhing into a void, as when we break an exhauſted bottle, makes a report like a muſket.

322 Partly controverted by Euler, but without ſufficient grounds.

Mr Robins's aſſertion therefore has every argument for its truth that the nature of the thing will admit. But we are not left to this vague reaſoning: his experiments ſhow us this diminution of reſiſtance. It clearly appears from them, that in a velocity of 1700 feet the reſiſtance is more than three times the reſiſtance determined by the theory which he ſuppoſes the common one. When the velocity was 1065 feet, the actual reſiſtance was $\frac{11}{7}$ of the theoretical; and when the velocity was 400 feet, the actual reſiſtance was about $\frac{4}{5}$ of the theoretical. That he aſſumed a theory of reſiſtance which gave them all too ſmall, is of no conſequence in the preſent argument.

323 Rule by Robins for computing reſiſtances and very rapid motions.

Mr Robins, in ſumming up the reſults of his obſervations on this ſubject, gives a rule very eaſily remembered for computing the reſiſtances to thoſe very rapid motions. It has been already mentioned in the article GUNNERY, but we repeat it here, in order to accommodate it to the quantities which have been determined in ſome degree by experiment.



Let AB repreſent the velocity of 1700 feet per ſecond, and AC any other velocity. Make BD to AD as the reſiſtance given by the ordinary theory to the reſiſtance actually obſerved in the velocity 1700: then will CD be to AD as the reſiſtance aſſigned by the ordinary theory to the velocity AC is to that which really correſponds to it.

To accommodate this to experiment, recollect * that a [illegible] ſphere of the ſize of a 12 pound iron ſhot, moving 25 feet [illegible] in a ſecond, had a reſiſtance of [illegible] of a pound. Augment this in the ratio of 25^2 to 1700^2, and we obtain 210 nearly for the theoretical reſiſtance to this velocity; but by comparing its diameter of $4\frac{1}{2}$ inches with $\frac{3}{4}$, the diameter of the leaden ball, which had a reſiſtance of at leaſt 11 pounds with this velocity, we conclude that the 12 pound ſhot would have had a reſiſtance of 396 pounds: therefore BD : AD = 210 : 396, and AB : AD = 186 : 396; and AB being 1700, AD will be 3613.

Let AD = a, AC = x, and let R be the reſiſtance to a 12 pound iron ſhot moving one foot per ſecond, and r the reſiſtance (in pounds) wanted for the velocity x;

[illegible] we have $r = R\frac{a x^2}{a-x}$. Mr Robins's experiments give $R = \frac{1}{13750}$ very nearly. This gives $Ra = 0,263235$, which is nearly one fourth. Thus our formula becomes $r = \frac{0,263235\ x^2}{3613 - x}$, or very nearly $\frac{x^2}{4(3613-x)}$, falling ſhort of the truth about $\frac{1}{19}$th part. The ſimplicity of the formula recommends it to our uſe, and when we increaſe its reſult $\frac{1}{19}$, it is incomparably nearer to the true reſult of the theory as corrected by Mr Robins than we can hope that the theory is to the actual reſiſtance. We can eaſily ſee that Mr Robins's correction is only a fallacious approximation. If we ſuppoſe the velocity 3613 feet, a very poſſible thing, the reſiſtance by this formula is infinite, which cannot be. We may even ſuppoſe that the reſiſtance given by the formula is near the truth only in ſuch velocities as do not greatly exceed 1700 feet per ſecond. No military projectile exceeds 2200, and it is great folly to make it ſo great, becauſe it is reduced to 1700 almoſt in an inſtant, by the enormous reſiſtance.

The reſiſtance to other balls will be made by taking them in the duplicate ratio of the diameters.

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The diſcuſſions of mathematicians not eaſily applied.

It has been already obſerved, that the firſt mathematicians of Europe have lately employed themſelves in improving this theory of the motion of bodies in a reſiſting medium; but their diſcuſſions are ſuch as few artilleriſts can underſtand. The problem can only be ſolved by approximation, and this by the quadrature of very complicated curves. They have not been able therefore to deduce from them any practical rules of eaſy application, and have been obliged to compute tables ſuited to different caſes. Of theſe performances, that of the Chevalier Borda, in the Memoirs of the Academy of Sciences for 1769, ſeems the beſt adapted to military readers, and the tables are undoubtedly of conſiderable uſe; but it is not too much to ſay, that the ſimple rules of Mr Robins are of as much ſervice, and are more eaſily remembered: beſides, it muſt be obſerved, that the nature of military ſervice does not give room for the application of any very preciſe rule. The only advantage that we can derive from a perfect theory would be an improvement in the conſtruction of pieces of ordnance, and a more judicious appropriation of certain velocities to certain purpoſes. The ſervice of a gun or mortar muſt always be regulated by the eye.

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Borda's and Robins's apparently the beſt.

326
Undulation of air.

There is another motion of which air and other elaſtic fluids are ſuſceptible, viz. an internal vibration of their particles, or undulation, by which any extended portion of air is diſtributed into alternate parcels of condenſed and rarefied air, which are continually changing their condition without changing their places. By this change the condenſation which is produced in one part of the air is gradually transferred along the maſs of air to the greateſt diſtances in all directions. It is of importance to have ſome diſtinct conception of this motion. It is found to be by this means that diſtant bodies produce in us the ſenſation of ſound. See ACOUSTICS. Sir Iſaac Newton treated this ſubject with his accuſtomed ingenuity, and has given us a theory of it in the end of the ſecond book of his *Principia*. This theory has been objected to with reſpect to the conduct of the argument, and other explanations have been given by the moſt eminent mathematicians. Though they appear to differ from Newton's, their reſults are preciſely the ſame; but, on a cloſe examination, they differ no more than John Bernouilli's theorem of centripetal forces differs from Newton's, viz. the one being expreſſed by geometry and the other by literal analyſis. The celebrated De la Grange reduces Newton's inveſtigation to a tautological propoſition or identical equation; but Mr Young of Trinity college, Dublin, has, by a different turn of expreſſion, freed Newton's method from this objection. We ſhall not repeat it here, but refer our mathematical readers to the article ACOUSTICS, as it is not our buſineſs at preſent to conſider its connection with ſound.

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Has been uſed to explain a variety of natural phenomena.

But ſince Newton publiſhed this theory of aerial undulations, and of their propagation along the air, and ſince the theory has been ſo corrected and improved as to be received by the moſt accurate philoſophers as a branch of natural philoſophy ſuſceptible of rigid demonſtration, it has been freely reſorted to by many writers on other parts of natural ſcience, who did not profeſs to be mathematicians, but made uſe of it for explaining phenomena in their own line on the authority of the mathematicians themſelves. Learning from them that this vibration, and the *quaquaverſum* propagation of the pulſes, were the neceſſary properties of an elaſtic fluid, and that the rapidity of this propagation had a certain aſſignable proportion to the elaſticity and denſity of the fluid, they freely made uſe of theſe conceſſions, and have introduced elaſtic vibrating fluids into many facts, where others would ſuſpect no ſuch thing, and have attempted to explain by their means many abſtruſe phenomena of nature. Æthers are everywhere introduced, endued with great elaſticity and tenuity. Vibrations and pulſes are ſuppoſed in this æther, and theſe are offered as explanations. The doctrines of animal ſpirits and nervous fluids, and the whole mechanical ſyſtem of Hartley, by which the operations of the ſoul are ſaid to be explained, have their foundation in this theory of aerial undulations. If theſe fancied fluids, and their internal vibrations, really operate in the phenomena aſcribed to them, any explanation that can be given of the phenomena from this principle muſt be nothing elſe than ſhowing that the legitimate conſequences of theſe undulations are ſimilar to the phenomena; or, if we are no more able to ſee this laſt ſtep than in the caſe of ſound (which we know to be *one* conſequence of the aerial undulations, although we cannot tell how), we muſt be able to point out, as in the caſe of ſound, certain conſtant relations between the general laws of theſe undulations and the general laws of the phenomena. It is only in this way that we think ourſelves intitled to ſay that the aerial undulations are cauſes, though not the only cauſes, of ſound; and it is becauſe there is no ſuch relation, but, on the contrary, a total diſſimilarity, to be obſerved between the laws of elaſtic undulations and the laws of the propagation of light, that we aſſert with confidence that ethereal undulations are not the cauſes of viſion.

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But the application not being made with ſufficient preciſion,

Explanations of this kind ſuppoſe, therefore, in the firſt place, that the philoſopher who propoſes them underſtands preciſely the nature of theſe undulations; in the next place, that he makes his reader ſenſible of thoſe circumſtances of them which are concerned in the effect to be explained; and, in the third place, that he makes the reader underſtand how this circumſtance of the vibrating fluid is connected with the phenomenon, either by ſhowing it to be its mechanical cauſe, as

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as when the philoſopher explains the reſounding of a muſical chord to a flute or pipe which gave the ſame tone; or by ſhowing that this circumſtance of the undulation always accompanies the phenomenon, as when the philoſopher ſhows that 233 vibrations of air in a ſecond, in whatever manner or by whatever cauſe they are produced always are followed by the ſenſation of the tone C in the middle of the harpſichord.

But here we muſt obſerve, that, with the exception of Euler's unſucceſsful attempt to explain the optical phenomena by the undulations of ether, we have met with no explanation of natural phenomena, by means of elaſtic and vibrating fluids, where the author has ſo much as attempted any one of theſe three things, ſo indiſpenſably requiſite in a logical explanation. They have talked of vibrations without deſcribing them, or giving the reader the leaſt notion of what kind they are; and in no inſtance that we can recollect have they ſhowed how ſuch vibrations could have any influence in the phenomenon. Indeed, by not deſcribing with preciſion the undulations, they were freed from the taſk of ſhowing them to be mechanical cauſes of the phenomenon; and when any of them ſhow any analogy between the general laws of elaſtic undulations and the general laws of the phenomenon, the analogy is ſo vague, indiſtinct, or partial, that no perſon of common prudence would receive it as argument in any caſe in which he was much intereſted.

329 has become the foundation of materialiſm.

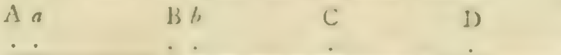
We think it our duty to remonſtrate againſt this ſlovenly way of writing: we would even hold it up to reprobation. It has been chiefly on this faithleſs foundation that the blind vanity of men has raiſed that degrading ſyſtem of opinions called Materialism, by which the affections and faculties of the ſoul of man have been reſolved into vibrations and pulſes of ether.

330 Of the motion of elaſtic fluids.

We alſo think it our duty to give ſome account of this motion of elaſtic fluids. It muſt be ſuch an account as ſhall be underſtood by thoſe who are not mathematicians, becauſe thoſe only are in danger of being miſled by the improper application of them. Mathematical diſcuſſion is, however, unavoidable in a ſubject purely mathematical; but we ſhall introduce nothing that may not be eaſily underſtood or confided in; and we truſt that mathematical readers will excuſe us for a mode of reaſoning which appears to them lax and inelegant.

331 How they differ from unelaſtic fluids in propagating any agitation of their parts.

The firſt thing incumbent on us is to ſhow how elaſtic fluids differ from the unelaſtic in the propagation of any agitation of their parts. When a long tube is filled with water, and any one part of it puſhed out of its place, the whole is inſtantly moved like a ſolid maſs. But this is not the caſe with air. If a door be ſuddenly ſhut, the window at the farther end of a long and cloſe room will rattle; but ſome time will elapſe between the ſhutting of the door and the motion of the window. If ſome light duſt be lying on a braced drum, and another be violently beat at a little diſtance from it, an attentive obſerver will ſee the duſt dance up from the parchment; but this will be at the inſtant he hears the ſound of the ſtroke on the other drum, and a ſenſible time after the ſtroke. Many ſuch familiar facts ſhow that the agitation is gradually communicated along the air; and therefore that when one particle is agitated by any ſenſible motion, a finite time, however ſmall, muſt elapſe before the adjoining particle is agitated in the ſame manner. This would not be the caſe in water if water be perfectly incompreſſible. We find that this difference may be made intelligible with very little trouble.



Let A, B, C, D, &c, be a row of aerial particles, at ſuch diſtances that their elaſticity juſt balances the preſſure of the atmoſphere; and let us ſuppoſe, as is deducible from the obſerved denſity of air being proportional to the compreſſing force, that the elaſticity of the particles, by which they keep each other at a diſtance, is as their diſtances inverſely. Let us farther ſuppoſe that the particle A has been carried, with an uniform motion, to *a* by ſome external force. It is evident that B cannot remain in its preſent ſtate; for being now nearer to *a* than to C, it is propelled towards C by the exceſs of the elaſticity of A above the natural elaſticity of C. Let E be the natural elaſticity of the particles, or the force correſponding to the diſtance BC or BA, and let *f* be the force exerted by A when at *a*. We have

$$\text{E} : f = \text{B}a : \text{BC}, = \text{B}a : \text{BA};$$
$$\text{and } \text{E} : f - \text{E} = \text{B}a : \text{BA} - \text{B}a = \text{B}a : \text{A}a;$$
$$\text{or } \text{E} : \text{F} = \text{B}a : \text{A}a.$$

Now in fig. 89. let ABC be the line joining three particles, to which draw FG, PH parallel, and IAF, HBG perpendicular. Take IF or HG to repreſent the elaſticity correſponding to the diſtance AB. Let the particle A be ſuppoſed to have been carried with an uniform motion to *a* by ſome external force, and draw R*a*M perpendicular to BG, and make FI : RM = B*a* : BA. We ſhall then have FI : PM = B*a* : A*a*; and PM will repreſent the force with which the particle B is urged towards C. Suppoſe this conſtruction to be made for every point of the line AB, and that a point M is thus determined for each of them, mathematicians know that all theſe points M lie in the curve of a hyperbola, of which FG and GH are the aſymptotes. It is alſo known by the elements of mechanics, that ſince the motion of A along AB is uniform, A*a* or IP may be taken to repreſent the time of deſcribing A*a*, and that the area IPM repreſents the whole velocity which B has acquired in its motion towards C when A has come to *a*, the force urging B being always as the portion PM of the ordinate.

Fig. 89.

Take GX of any length in HG produced, and let GX repreſent the velocity which the uniform action of the natural elaſticity IF could communicate to the particle B during the time that A moved uniformly in deſcribing AB. Make GX to GY as the rectangle IFGH to the hyperbolic ſpace IFRM, and draw YS cutting MR produced in S, and draw FX cutting MR in T. It is known to the mathematicians that the point S is in a curve line FSs called the logarithmic curve, of which the leading property is, that any line RS parallel to GX is to GX as the rectangle IFGH is to the hyperbolic ſpace IFRM, and that FX touches the curve in F.

This being the caſe, it is plain, that becauſe RT increaſes in the ſame proportion with FR, or with the rectangle IFRP, and RS increaſes in the proportion of the ſpace IFRM, TS increaſes in the proportion of the ſpace IPM. Therefore TS is proportional to the velocity of B when A has moved A *a*, and RT is proportional to the velocity which the uniform action of the natural elaſticity would communicate to B in the ſame time. Then ſince FT is as the time, and TS is as the velocity, the area FTS will be as the ſpace deſcribed by B (urged by the variable force PM); while A, urged by the external force, deſcribes A *a*; and the triangle FRT will repreſent the ſpace which the uniform action of the natural elaſticity would cauſe B to deſcribe in the ſame time.

And thus it is plain that theſe three motions can be compared together: the uniform motion of the agitated particle A, the uniformly accelerated motion which the natural elaſticity would communicate to B by its conſtant action, and the motion produced in B by the agitation of A. But this compariſon, requiring the quadrature of the hyperbola and logarithmic curve, would lead us into moſt intricate and tedious computations. Of theſe we need only give the reſult, and make ſome other compariſons which are palpable.

Let A*a* be ſuppoſed indefinitely ſmall in compariſon of AB. The ſpace deſcribed by A is therefore indefinitely ſmall; but in this caſe we know that the ratio of the ſpace FRT to the rectangle IFRP is indefinitely ſmall. There is therefore no compariſon between the agitation of A by the external force, and the agitation which natural elaſticity would produce on a ſingle particle in the ſame time, the laſt being incomparably ſmaller than the firſt. And this ſpace FRT is incomparably greater than FTS; and therefore the ſpace which B would deſcribe by the uniform action of the natural elaſticity is incomparably greater than what it would deſcribe in conſequence of the agitation of A.

From this reaſoning we ſee evidently that A muſt be ſenſibly moved, or a finite or meaſurable time muſt elapſe before B acquires a meaſurable motion. In like manner B muſt move during a meaſurable time before C acquires a meaſurable motion, &c.; and therefore the agitation of A is communicated to the diſtant particles in gradual ſucceſſion.

By a farther compariſon of theſe ſpaces we learn the time in which each ſucceeding particle acquires the very agitation of A. If the particles B and C only are conſidered, and the motion of C neglected, it will be found that B has acquired the motion of A a little before it has deſcribed $\frac{1}{2}$ of the ſpace deſcribed by A; but if the motion of C be conſidered, the acceleration of B muſt be increaſed by the retreat of C, and B muſt deſcribe a greater ſpace in proportion to that deſcribed by A. By computation it appears, that when both B and C have acquired the velocity of A, B has deſcribed nearly $\frac{1}{2}$ of A's motion, and C more nearly $\frac{1}{2}$. Extending this to D, we ſhall find that D has deſcribed ſtill more nearly $\frac{1}{2}$ of A's motion. And from the nature of the computation it appears that this approximation goes on rapidly: therefore, ſuppoſing it accurate from the very firſt particle, it follows from the equable motion of A, that each ſucceeding particle moves through an equal ſpace in acquiring the motion of A.

The concluſion which we muſt draw from all this is, that when the agitation of A has been fully communicated to a particle at a *ſenſible* diſtance, the intervening particles, all moving forward with a common velocity, are equally compreſſed as to ſenſe, except a very few of the firſt particles; and that this communication, or this propagation of the original agitation, goes on with an uniform velocity.

Theſe computations need not be attended to by ſuch as do not wiſh for an accurate knowledge of the preciſe agitation of each particle. It is enough for ſuch readers to ſee clearly that time *muſt* eſcape between the agitation of A and that of a diſtant particle; and this is abundantly manifeſt from the incomparability (excuſe the term) of the naſcent rectangle IFRP with the naſcent triangle FRT, and the incomparability of FRT with FTS.

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Newton's demonſtration on this ſubject juſt as far as it goes;

What has now been ſhown of the communication of any ſenſible motion A *a* muſt hold equally with reſpect to any change of this motion. Therefore if a tremulous motion of a body, ſuch as a ſpring or bell, ſhould agitate the adjoining particle A by puſhing it forward in the direction AB, and then allowing it to come back again in the direction BA, an agitation ſimilar to this will take place in all the particles of the row one after the other. Now if this body vibrate according to the law of motion of a pendulum vibrating in a cycloid, the neighbouring particle of air *will of neceſſity* vibrate in the ſame manner; and then Newton's demonſtration in art. Acoustics needs no apology. Its only deficiency was, that it *ſeemed* to prove that this *would be* the way in which every particle would of neceſſity vibrate; which is not true, for the ſucceſſive parcels of air will be differently agitated according to the original agitation. Newton only wants to prove the uniform propagation of the agitations, and he ſelects that form which renders the proof eaſieſt. He proves, in the moſt unexceptionable manner, that if the particles of a pulſe of air are really moving like a cycloidal pendulum, the forces acting on each particle, in conſequence of the compreſſion and dilatation of the different parts of the pulſe, are preciſely ſuch as are neceſſary for continuing this motion, and therefore no other forces are required. Then ſince each particle is in a certain part of its path, is moving in a certain direction, and with a certain velocity, and urged by a determined force, it *muſt* move in that very manner. The objection ſtarted by John Bernouilli againſt Newton's demonſtration (in a ſingle line) of the elliptical motion of a body urged by a force in the inverſe duplicate ratio of the diſtance from the focus, is preciſely the ſame with the objection againſt Newton's demonſtration of the progreſs of aerial undulations, and is equally futile.

It muſt, however, be obſerved, that Newton's demonſtration proceeds on the ſuppoſition that the linear agitations of a particle are incomparably ſmaller than the extent of an undulation. This is not ſtrictly the caſe in any inſtance, and in many it is far from being true. In a pretty ſtrong twang of a harpſichord wire, the agitation of a particle may be near the 50th part of the extent of the undulation. This muſt diſturb the regularity of the motion, and cauſe the agitations in the remote undulations to differ from thoſe in the firſt pulſe. In the exploſion of a cannon, the breaking of an exhauſted bottle, and many inſtances which may be given, the agitations are ſtill greater. The commentators on Newton's *Principia*, Le Sueur and Jacquier, have ſhown, and Euler more clearly, that when the original agitations are very violent, the particles of air will acquire a ſubordinate vibration compounded with the regular cycloidal vibration, and the progreſs of the pulſes will be

ſomewhat

Undulation of Air.

ſomewhat more rapid; but the intricacy of the calculus is ſo great, that they have not been able to determine with any tolerable preciſion what the change of velocity will be.

333 It is ſtrengthened by comparing the ſound of a cannon near and at a diſtance.

All this, however, is fully confirmed by experiment on ſounds. The ſound of a cannon at 10 or 20 miles diſtance does not in the leaſt reſemble its ſound when near. In this caſe it is a loud inſtantaneous crack, to which we can aſſign no muſical pitch: at a diſtance, it is a grave ſound, of which we can tell the note; and it begins ſoftly, ſwells to its greateſt loudneſs, and then dies away growling. The ſame may be ſaid of a clap of thunder, which we know to be a loud ſnap of ſtill leſs duration. It is highly probable that the appreciable tones which thoſe diſtant ſounds afford are produced by the continuance of theſe ſubordinate vibrations which are added together and fortified in the ſucceſſive pulſes, though not perceptible in the firſt, in a way ſomewhat reſembling the reſonance of a muſical chord. Newton's explanation gathers evidence therefore from this circumſtance. And we muſt further obſerve, that all elaſtic bodies tremble or vibrate almoſt preciſely as a pendulum ſwinging in a cycloid, unleſs their vibrations are uncommonly violent; in which caſe they are quickly reduced to a moderate quantity by the reſiſtance of the air. The only very loud ſounds which we can produce in this way are from great bells; and in theſe the utmoſt extent of the vibration is very ſmall in compariſon with the breadth of the pulſe. The velocity of theſe ſounds has not been compared with that of cannon, or perhaps it would be found leſs, and an objection againſt Newton's determination removed. He gives 969 feet per ſecond, Experiment 1142.

334. The agitation in all probability in the ſucceſſive pulſes aſſumes a cycloidal form.

But it is alſo very probable, that in the propagation through the air, the agitation gradually and rapidly approaches to this regular cycloidal form in the ſucceſſive pulſes, in the ſame way as we obſerve that whatever is the form of agitation in the middle of a ſmooth pond of water, the ſpreading circles are always of one gentle form without aſperities. In like manner, into whatever form we throw a ſtretched cord by the twang which we give it, it almoſt immediately makes ſmooth undulations, keeping itſelf in the ſhape of an elongated trochoid. Of this laſt we can demonſtrate the neceſſity, becauſe the caſe is ſimple. In the wave, the inveſtigation is next to impoſſible; but we ſee the fact. We may therefore preſume it in air. And accordingly we know that any noiſe, however abrupt and jarring, near at hand, is ſmooth at a diſtance. Nothing is more rough and harſh than the ſcream of a heron; but at half a mile's diſtance it is ſoft. The ruffle of a drum is alſo ſmooth at a diſtance.

Plate CCCCXXXII. fig. 90.

Fig. 90. ſhows the ſucceſſive ſituations of the particles of a row. Each line of the figure ſhows the ſame particles marked with the ſame letters; the firſt particle *a* being ſuppoſed to be removed ſucceſſively from its quieſcent ſituation and back to it again. The mark × is put on that part of each line where the agitated particles are at their natural diſtances, and the air is of the natural denſity. The mark 1 is put where the air is moſt of all compreſſed, and : where it is moſt of all dilated; the curve line drawn through the loweſt line of the figure is intended to repreſent the denſity in every point, by drawing ordinates to it from the ſtraight line: the ordinates below the line indicate a rarity, and thoſe above the line a denſity, greater than common.

Undulation of Air.

It appears that when *a* has come back to its natural ſituation, the part of greateſt denſity is between the particles *i* and *k*, and the greateſt rarity between *c* and *d*.

We have only to add, that the velocity of this propagation depends on the elaſticity and denſity of the fluid. If theſe vary in the ſame proportion, that is, if the fluid has its elaſticity proportional to its denſity, the velocity will remain the ſame. If the elaſticity or denſity alone be changed, the velocity of the undulations will change in the direct ſubduplicate ratio of the elaſticity and the inverſe ſubduplicate ratio of the denſity; for ſhould the elaſticity be quadrupled, the quantity of motion produced by it in any given time will be quadrupled. This will be the caſe if the velocity be doubled; for there would then be double the number of particles doubly agitated. Should the denſity be quadrupled, the elaſticity remaining the ſame, the quantity of motion muſt remain the ſame. This will be the caſe if the velocity be reduced to one half; for this will propagate half the agitation to half the diſtance, which will communicate it to twice the number of particles, and the quantity of motion will remain the ſame. The ſame may be ſaid of other proportions, and therefore $V = \frac{\sqrt{E}}{\sqrt{D}}$. Therefore a change in the barometer will not affect the velocity of the undulations in air; but they will be accelerated by heat, which diminiſhes its denſity, or increaſes its elaſticity. The velocity of the pulſes in inflammable air muſt be at leaſt thrice as great, becauſe its denſity is but one-tenth of that of air when the elaſticity of both are the ſame.

335 Farther conſideration of aerial pulſes as they really occur.

Let us now attend a little to the propagation of aerial pulſes as they really happen; for this hypotheſis of a ſingle row of particles is nowhere to be obſerved.

Fig. 91.

Suppoſe a ſphere A, fig. 91. filled with condenſed air, and that the veſſel which contains it is ſuddenly annihilated. The air muſt expand to its natural dimenſions, ſuppoſe BCD. But it cannot do this without preſſing aſide the ſurrounding air. We have ſeen that in any ſingle row of particles this cannot be at once diffuſed to a diſtance, but muſt produce a condenſation in the air adjoining; which will be gradually propagated to a diſtance. Therefore this ſphere BCD of the common denſity will form round it a ſhell, bounded by EFG, of condenſed air. Suppoſe that at this inſtant the inner air BCD becomes ſolid. The ſhell of condenſed air can expand only outwards. Let it expand till it is of the common denſity, occupying the ſhell HIK. This expanſion, in like manner, muſt produce a ſhell of condenſed air without it: at this inſtant let HIK become ſolid. The ſurrounding ſhell of condenſed air can expand only outward, condenſing another ſhell without it. It is plain that this muſt go on continually, and the central agitation will be gradually propagated to a diſtance in all directions. But, in this caſe, it is not the ſame numerical particles that go to a diſtance. Thoſe of the original ſphere go no farther than BCD, thoſe of the next ſhell go no farther than HIK, &c. Further, the excurſion outwards of any particle will be more moderate as the diffuſion advances; for the whole motion of each ſhell cannot exceed the original quantity of motion; and the number of particles in each ſucceſſive ſhell increaſes as the ſurface, that is, as the ſquare of the diſtance from the centre; therefore the agitation of the particles will decreaſe in the ſame ratio, or will be in the inverſe duplicate ratio of the diſtance from the centre. Each ſucceſſive ſhell, therefore, contains the ſame quantity of motion, and the ſucceſſive agitations of the particles of any row out from the centre will not be equal to the original agitation, as happens in the ſolitary row. But this does not affect the velocity of the propagation, becauſe all agitations are propagated equally faſt.

We ſuppoſed the air A to become ſolid as ſoon as it acquired the common denſity; but this was to facilitate the conception of the diffuſion. It does not ſtop at this bulk; for while it was denſer it had a tendency to expand. Therefore each particle has attained this diſtance with an accelerated motion. It will, therefore, continue this motion like a pendulum that has paſſed the perpendicular, till it is brought to reſt by the air without it; and it is now rarer than common air, and collapſes again by the greater elaſticity of the air without it. This outward air, therefore, in regaining its natural denſity, muſt expand both ways. It expands towards the centre, following the collapſing of the air within it; and it expands outwards, condenſing the air beyond it. By expanding inwards, it will again condenſe the air within it, and this will again expand; a ſimilar motion happens in all the outward ſhells; and thus there is propagated a ſucceſſion of condenſed and rarefied ſhells of air, which gradually ſwell to the greateſt diſtance.

336
Application of the fact of dropping a pebble into water.

It may be demonſtrated, that when the central air has for the ſecond time acquired the natural denſity, it will be at reſt, and be diſturbed no more; and that this will happen to all the ſhells in ſucceſſion. But the demonſtration is much too intricate for this place; we muſt be contented with pointing out a fact perfectly analogous. When we drop a ſmall pebble into water, we ſee it produce a ſeries of circular waves, which go along the ſurface of ſmooth water to a great diſtance, becoming more and more gentle as they recede from the centre; and the middle, where the agitation was firſt produced, remains perfectly ſmooth, and this ſmoothneſs extends continually; that is, each wave when brought to a level remains at reſt. Now theſe waves are produced and propagated by the depreſſion and elevation made at the centre. The elevation tends to diffuſe itſelf; and the force with which each particle of water is actuated is a force acting directly up and down, and is proportional to the elevation or depreſſion of the particle. This hydroſtatical preſſure operates preciſely in the ſame way as the condenſation and rarefaction of the air; and the mathematical inveſtigation of the propagation of the circular undulations on ſmooth water is ſimilar in every ſtep to that of the propagation of the ſpherical waves in ſtill air. For this we appeal to Newton's *Principia*, or to Euler's *Opuſcula*, where he gives a very beautiful inveſtigation of the velocity of the aerial pulſes; and to ſome memoirs of de la Grange in the collections of the academies of Berlin and Turin. Theſe two laſt authors have made the inveſtigation as ſimple as ſeems poſſible, and have freed it from every objection which can be ſtated againſt the geometrical one of their greater teacher Newton.

337
The waves of water are uſeful for explaining those of air.

Having ſaid this much on the ſimilarity between the waves on water and the aerial undulations, we ſhall have recourſe to them, as affording us a very ſenſible object to repreſent many affections of the other which it would be extremely difficult to explain. We neither ſee nor feel the aerial undulations; and they behoved, therefore, to be deſcribed very abſtractedly and imperfectly. In the watery wave there is no permanent progreſſive motion of the water from the centre. Throw a ſmall bit of cork on the ſurface, and it will be obſerved to popple up and down without the leaſt motion outwards. In like manner, the particles of air are only agitated a very little outwards and inwards; which motion is communicated to the particles beyond them, while they themſelves come to reſt, unleſs agitated afreſh; and this agitation of the particles is inconceivably ſmall. Even the exploſion of a cannon at no great diſtance will but gently agitate a feather, giving it a ſingle impulſe outwards, and immediately after another inwards or towards the cannon. When a harpſichord wire is forcibly twanged at a few feet diſtance, the agitation of the air is next to inſenſible. It is not, however, nothing; and it differs from that in a watery wave by being *really* outwards and inwards. In conſequence of this, when the condenſed ſhell reaches an elaſtic body, it impels it ſlightly. If its elaſticity be ſuch as to make it acquire the oppoſite ſhape at the inſtant that the next agitation and condenſed ſhell of air touches it, its agitation will be doubled, and a third agitation will increaſe it, and ſo on, till it acqure the agitation competent to that of the ſhell of air which reaches it, and it is thrown into *ſenſible* vibration, and gives a ſound extremely faint indeed, becauſe the agitation which it acquires is that correſponding to a ſhell of air conſiderably removed from the original ſtring. Hence it happens that a muſical chord, pipe, or bell, will cauſe another to reſound, whoſe vibrations are iſochronous with its own; or if the vibrations of the one coincides with every ſecond, or third, or fourth, &c. of the other; juſt as we can put a very heavy pendulum into ſenſible motion by giving it a gentle puff with the breath at every vibration, or at every ſecond, third, or fourth, &c. A drum ſtruck in the neighbourhood of another drum will agitate it *very ſenſibly*; for here the ſtroke depreſſes a very conſiderable ſurface, and produces an agitation of a conſiderable maſs of air: it will even agitate the ſurface of ſtagnant water. The exploſion of a cannon will even break a neighbouring window. The ſhell of condenſed air which comes againſt the glaſs has a great ſurface and a great agitation: the beſt ſecurity in this caſe is to throw up the ſaſh; this admits the condenſed air into the room, which acts on the inſide of the window, balancing part of the external impulſe.

338
For waves of air and of water are in many reſpects very ſimilar.

It is demonſtrated in every elementary treatiſe of natural philoſophy, that when a wave on water meets any plane obſtacle, it is reflected by it from a centre equally removed behind the obſtacle; that waves radiating from the focus of a parabola are reflected in waves perpendicular to its axis; that waves radiating from one focus of an ellipſe are made to converge to the other focus, &c. &c. All this may be affirmed of the aerial undulations; that when part of a wave gets through a hole in the obſtacle, it becomes the centre of a new ſeries of waves; that waves bend round the extremities of

Undulations of air.

of an obstacle: all this happens in the aerial undulations. And lastly, that when the surface of water is thrown into regular undulations by one agitation, another agitation in another place will produce other regular waves, which will cross the former without disturbing them in the smallest degree. The same thing happens in air; and experiments may be made on water which will illustrate in the most perfect manner many other affections of the aerial pulses, which we should otherwise conceive very imperfectly. We would recommend to our curious readers to make some of these experiments in a large vessel of milk. Take a long and narrow piece of lead, which, when set on the bottom of the veſſel will reach above the ſurface of the milk; bend this plate into a parabolic, elliptical, or other curve. Make the undulations by dropping milk on the focus from a ſmall pipe, which will cauſe the agitations to ſucceed with rapidity, and then all that we have ſaid will be most distinctly seen, and the experiment will be very amuſing and inſtructive, eſpecially to the muſical reader.

339
Caution to the supporters of ether, animal spirits, &c.

We would now requeſt all who make or read explanations of natural phenomena by means of vibrations of ethers, animal spirits, nervous fluids, &c. to fix their attention on the nature of the agitation in one of theſe undulations. Let him conſider whether this can produce the phenomenon, acting as any matter must act, by impulſe or by preſſure. If he ſees that it can produce the phenomenon, he will be able to point out the very motion it will produce, both in quantity and direction, in the ſame manner as Sir Iſaac Newton has pointed out all the irregularities of the moon's motion produced by the diſturbing force of the ſun. If he cannot do this, he fails in giving the firſt evidence of a mechanical explanation by the action of an elaſtic vibrating fluid. Let him then try to point out ſome palpable connection between the general phenomena of elaſtic undulations and the phenomenon in queſtion; this would ſhow an accompaniment to have at leaſt ſome probability. It is thus only we learn that the undulations of air produce ſound: we cannot tell how they affect the mechaniſm of the ear; but we ſee that the phenomena of ſound always accompany them, and that certain modifications of the one are regularly accompanied by certain modifications of the other. If we cannot do this neither, we have derived neither explanation nor illuſtration from the elaſtic fluid. And laſtly, let him remember that even if he ſhould be able to ſhow the competency of this fluid to the production of the phenomenon, the whole is ſtill an hypotheſis, becauſe we do not know that ſuch a fluid exiſts.

340
The folly of appealing to such unknown ſubſtances.

We will venture to ſay, that whoever will proceed in this prudent manner will ſoon ſee the futility of moſt of the explanations of this kind which have been given. They are unfit for any but conſummate mathematicians; for they alone really underſtand the mechaniſm of aerial undulations, and even they ſpeak of them with heſitation as a thing but imperfectly underſtood. But even the unlearned in this ſcience can ſee the incompatibility of the hypotheſes with many things which they are brought to explain. To take an inſtance of the conveyance of ſenſation along the nerves; an elaſtic fluid is ſuppoſed to occupy them, and the undulations of this fluid are thought to be propagated along the nerves. Let us juſt think a little how the undulations would be conveyed along the [illegible] which was completely [illegible] or let us make the experiment [illegible] reſt aſſured that the undulations in the one caſe will reſemble those in the other; [illegible] there will be no [illegible] the waves.

Let [illegible] other [illegible] their means.

[illegible] of the motion, impulſe, and reſiſtance of air.

We ſhall [illegible] appearances, depending on its preſſure and elaſticity, appearances not ſufficiently general, or too complicated, for the purpoſes of argument, while we were employed in the inveſtigation of theſe properties, but too important to be paſſed over in ſilence.

341
Cohesion by preſſure oc- [illegible] two ſurfaces accurately fitting each other;

It is owing to the preſſure of the atmoſphere that two ſurfaces which accurately fit each other cohere with ſuch force. This is a fact familiarly known to the glaſs-grinders, poliſhers of marble, &c. A large lens or ſpeculum, ground on its tool till it becomes very ſmooth, requires more than any man's ſtrength to ſeparate it directly from the tool. If the ſurface is only [illegible] inch, it will require 15 pounds to ſeparate them perpendicularly, though a very moderate force will make them ſlide along each other. But this coheſion is not obſerved unleſs the ſurfaces are wetted or ſmeared with oil or greaſe; otherwiſe the air gets between them, and they ſeparate without any trouble. That this coheſion is owing to the atmoſpheric preſſure, is evident from the eaſe with which the plates may be ſeparated in an exhauſted receiver.

342
[illegible] adheſion of ſnails, &c.

To the ſame cauſe we muſt aſcribe the very ſtrong adheſion of ſnails, periwinkles, limpets, and other univalve ſhells, to the rocks. The animal forms the rim of its ſhell, ſo as to fit the ſhape of the rock to which it intends to cling. It then fills its ſhell (if not already filled by its own body) with water. In this condition it is evident that we muſt act with a force equal to 15 pounds for every ſquare inch of touching ſurface before we can detach it. This may be illuſtrated by filling a drinking glaſs to the brim with water; and having covered it with a piece of thin wet leather, whelm it on a table, and then try to pull it ſtraight up; it will require a conſiderable force. But if we expoſe a ſnail adhering to a ſtone in the exhauſted receiver, we ſhall ſee it drop off by its own weight. In the ſame manner do the remora, the polypus, the lamprey, and many other animals, adhere with ſuch firmneſs. Boys frequently amuſe themſelves by pulling out large ſtones from the pavement by means of a circle of ſtiff wetted leather faſtened to a ſtring. It is owing to the ſame cauſe that the bivalve ſhell fiſhes keep themſelves ſo firmly ſhut. We think the muſcular force of an oyſter prodigious, becauſe it requires ſuch force to open it: but if we grind off a bit of the convex ſhell, ſo as to make a hole in it, though without hurting the fiſh, [illegible]

[illegible]

eſt degree, it opens with great eaſe, as it does alſo *in vacuo*.

343 Other effects of the air's preſſure.

The preſſure of the air, operating in this way, contributes much to the coheſion of bodies, where we do not ſuſpect its influence. The tenacity of our mortars and cements would frequently be ineffectual without this aſſiſtance.

It is owing to the preſſure of the atmoſphere that a caſk will not run by the cock unleſs a hole be opened in ſome other part of the caſk. If the caſk is not quite full, ſome liquor indeed will run out, but it will ſtop as ſoon as the diminiſhed elaſticity of the air above the liquor is in equilibrio (together with the liquor) with the atmoſpheric preſſure. In like manner, a teapot muſt have a ſmall hole in its lid to enſure its pouring out the tea. If indeed the hole in the caſk is of large dimenſions, it will run without any other hole, becauſe air will get in at the upper ſide of the hole while the liquor runs out by the lower part of it.

Plate CCCCXXXI. fig. 74.

On the ſame principle depends the performance of an inſtrument uſed by the ſpirit dealers for taking out a ſample of their ſpirits. It conſiſts of a long tinplate tube AB (fig. 74.), open a-top at A, and ending in a ſmall hole at B. The end B is dipped into the ſpirits, which riſes into the tube; then the thumb is clapt on the mouth A, and the whole is lifted out of the caſk. The ſpirit remains in it till the thumb be taken off; it is then allowed to run into a glaſs for examination.

344 Why froſts inſtantly occaſion a ſcarcity of water.

It ſeems principally owing to the preſſure of the air that froſts immediately occaſion a ſcantineſs of water in our fountains and wells. This is erroneouſly accounted for, by ſuppoſing that the water freezes in the bowels of the earth. But this is a great miſtake: the moſt intenſe froſt of a Siberian winter would not freeze the ground two feet deep; but a very moderate froſt will conſolidate the whole ſurface of a country, and make it impervious to the air; eſpecially if the froſt has been preceded by rain, which has ſoaked the ſurface. When this happens, the water which was filtering through the ground is all arreſted and kept ſuſpended in its capillary tubes by the preſſure of the air, in the very ſame manner as the ſpirits are kept ſuſpended in the inſtrument juſt now deſcribed by the thumb's ſhutting the hole A. A thaw melts the ſuperficial ice, and allows the water to run in the ſame manner as the ſpirits run when the thumb is removed.

345 The neceſſity of common air to animal life.

Common air is neceſſary for ſupporting the lives of moſt animals. If a ſmall animal, ſuch as a mouſe or bird, be put under the receiver of an air-pump, and the air be exhauſted, the animal will quickly be thrown into convulſions and fall down dead; if the air be immediately readmitted, the animal will ſometimes revive, eſpecially if the rarefaction has been briſkly made, and has not been very great. We do not know that any breathing animal can bear the air to be reduced to one-fourth of its ordinary denſity, nor even one-third; nor have we good evidence that an animal will ever recover if the rarefaction is puſhed very far, although continued for a very ſhort time.

Fig. 75.

But the mere preſence of the air is by no means ſufficient for preſerving the life of the animal; for it is found, that an animal ſhut up in a veſſel of air cannot live in it for any length of time. If a man be ſhut up in a box, containing a wine hogſhead of air, he cannot live in it much above an hour, and long before this he will find his breathing very unſatisfactory and uneaſy. A gallon of air will ſupport him about a minute. A box EF (fig. 75.) may be made, having a pipe AB inſerted into its top, and fitted with a very light valve at B, opening upwards. This pipe ſends off a lateral branch *a* D *d* C, which enters the box at the bottom, and is alſo fitted with a light valve at C opening upwards. If a perſon breathe through the pipe, keeping his noſtrils ſhut, it is evident that the air which he expires will not enter the box by the hole B, nor return through the pipe CD *d*; and by this contrivance he will gradually employ the whole air of the box. With this apparatus experiments can be made without any riſk or inconveniency, and the quantity of air neceſſary for a given time of eaſy breathing may be accurately aſcertained.

How the air of our atmoſphere produces this effect, is a queſtion which does not belong to mechanical philoſophy to inveſtigate or determine. We can, however, affirm, that it is neither the preſſure nor the elaſticity of the air which is immediately concerned in maintaining the animal functions. We know that we can live and breathe with perfect freedom on the tops of the higheſt mountains. The valley of Quito in Peru, and the country round Gondar in Abyſſinia, are ſo far elevated above the ſurface of the ocean, that the preſſure and the elaſticity of the air are one-third leſs than in the low countries; yet theſe are populous and healthy places. And, on the other hand, we know, that when an animal has breathed in any quantity of air for a certain time without renewal, it will not only be ſuffocated, but another animal put into this air will die immediately; and we do not find either the preſſure or elaſticity of the air remarkably diminiſhed: it is indeed diminiſhed, but by a very ſmall quantity. Reſtoring the former preſſure and elaſticity has not the ſmalleſt tendency to prevent the death of the animal: for an animal will live no longer under a receiver that has its mouth inverted on water, than in one ſet upon the pump-plate covered with leather. Now when the receiver is ſet on water, the preſſure of the atmoſphere acts completely on the included air, and preſerves it in the ſame ſtate of elaſticity.

346 The nature of air when it has maintained animal functions is quite altered.

In ſhort, it is known that the air which has already ſerved to maintain the animal functions has its chemical and alimentary properties completely changed, and is no longer fit for this purpoſe. So much of any maſs of air as has really been thus employed is changed into what is called *fixed air* by Dr Black, or *carbonic acid* by the chemiſts of the Lavoiſierian ſchool. Any perſon may be convinced of this by breathing or blowing through a pipe immerſed in lime water. Every expiration will produce white clouds on the water, till all the lime which it contains is precipitated in the form of pure chalk. In this caſe we know that the lime has combined with the fixed air.

347 Hales's experiments to reſtore its former qualities, &c.

The celebrated Dr Stephen Hales made many experiments, with a view to clear the air from the noxious vapour which he ſuppoſed to be emitted from the lungs.

He made uſe of the apparatus which we have been juſt now mentioning; and he put ſeveral diaphragms *ff*, *ff*, &c. of thin woollen ſtuff into the box, and moiſtened them with various liquids. He found nothing ſo efficacious as a ſolution of potaſh. We now underſtand

Effects of Air's preſſure.

ſtand this perfectly. If the ſolution is not already ſaturated with fixed air, it will take it up as faſt as it is produced, and thus will purify the air: a ſolution of cauſtic alkali therefore will have this effect till it is rendered quite mild.

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How it comes to be changed by breathing, and the nature of reſpiration, &c.

Theſe experiments have been repeated, and varied in many circumſtances, in order to aſcertain whether this fixed air was really emitted by the lungs, or whether the inſpired air was in part changed into fixed air by its combination with ſome other ſubſtance. This is a queſtion which comes properly in our way, and which the doctrines of pneumatics enable us to anſwer. If the fixed air be emitted in ſubſtance from the lungs, it does not appear how a renewal of the air into which it is emitted is neceſſary: for this does not hinder the ſubſequent emiſſion; and the bulk of the air would be increaſed by breathing in it, viz. by the bulk of all the fixed air emitted; but, on the contrary, it is a little diminiſhed. We muſt therefore adopt the other opinion; and the diſcoveries in modern chemiſtry enable us to give a pretty accurate account of the whole proceſs. Fixed air is acknowledged to be a compound, of which one ingredient is found to conſtitute about three-eighths of the whole atmoſpheric fluid; we mean vital air or the oxygen of Lavoiſier. When this is combined with phlogiſton, according to the doctrine of Stahl, or with charcoal, according to Lavoiſier, the reſult is fixed air or carbonic acid. The change therefore which breathing makes on the air is the ſolution of this matter by vital air; and the uſe of air in breathing is the carrying off this noxious principle in the way of ſolution. When therefore the air is already ſo far ſaturated as not to diſſolve this ſubſtance as faſt as it is ſecreted, or muſt be ſecreted in the lungs, the animal ſuffers the pain of ſuffocation, or is otherwiſe mortally affected. Suffocation is not the only conſequence; for we can remain for a number of ſeconds without breathing, and then we begin to feel the true pain of ſuffocation; but thoſe who have been inſtantaneouſly ſtruck down by an inſpiration of fixed air, and afterwards recovered to life, complained of no ſuch pain, and ſeemed to have ſuffered chiefly by a nervous affection. It is ſaid (but we will not vouch for the truth of it), that a perſon may ſafely take a full inſpiration of fixed air, if the paſſages of the noſe be ſhut; and that unleſs theſe nerves are ſtimulated by the fixed air, it is not inſtantaneouſly mortal. But theſe are queſtions out of our preſent line of inquiry. They are queſtions of phyſiology, and are treated of in other places of this work. See ANATOMY and PHYSIOLOGY; ſee alſo LUNGS and RESPIRATION. Our buſineſs is to explain in what manner the preſſure and elaſticity of the air, combined with the ſtructure and mechaniſm of the body, operate in producing this neceſſary ſecretion and removal of the matter diſcharged from the lungs in the act of breathing.

It is well aſcertained, that the ſecretion is made from the maſs of blood during its paſſage through the lungs. The blood delivered into the lungs is of a dark blackiſh colour, and is there changed into a florid red. In the lungs it is expoſed to the action of the air in a prodigiouſly extended ſurface: for the lungs conſiſt of an inconceivable number of ſmall veſſels or bladders, communicating with each other and with the windpipe. Theſe are filled with air in every inſpiration. Theſe veſſels are everywhere in contact with minute blood veſſels. The blood does not however come into immediate contact with the air; and it would ſeem that it is only the thin ſerous part of it which is acted on by the air at the mouths of the veſſels or pores, where it ſtands by capillary attraction. Dr Prieſtley found, that venous blood incloſed in thin bladders and other membranes was rendered florid by keeping the bladder in contact with abundance of pure vital air. We know alſo, that breath is moiſt or damp, and muſt have acquired this moiſture in, the lungs. It is immaterial whether this ſecretion of water or lymph (as the anatomiſts call it) be furniſhed by mere exudation through ſimple pores, or by a vaſcular and organic ſecretion; in either caſe, ſome ingredient of the blood comes in contact with air in the lungs, and there unites with it. This is farther confirmed, by obſerving, that all breathing animals are warmer than the ſurrounding medium, and that by every proceſs in which fixed air is formed from vital air heat is produced. Hence this ſolution in air of ſomething from the blood has been aſſigned by many as the ſource of animal heat. We touch on theſe things in a very tranſitory way in this place, only in order to prove that, for the ſupport of animal life, there muſt be a very extenſive application of air to the blood, and that this is made in the lungs.

The queſtion before us in this place is, How is this brought about by the weight and elaſticity of the air? This is done in two ways; by the action of the muſcles of the ribs, and by the action of the diaphragm and other muſcles of the abdomen. The thorax or cheſt is a great cavity, completely filled by the lungs. The ſides of this cavity are formed by the ribs. Theſe are crooked or arched, and each is moveable round its two ends, one of them being inſerted into the vertebræ of the back, and the other into the ſternum or breaſt-bone. The rib turns in a manner reſembling the handle of a drawer. The inſpection of fig. 76. will illuſtrate this matter a little. Suppoſe the curves *a c e*, *b k f*, *c l g*, &c. to repreſent the ribs moveable round the extremities. Each ſucceeding rib is more bent than the one above it, and this curvature is both in the vertical and horizontal direction. Suppoſe each ſo broad as to project a little over its inferior like the tiles of a roof. It is evident, that if we take the lower one by its middle, and draw it out a little, moving it round the line *n p*, it will bring out the next *d m h* along with it. Alſo, becauſe the diſtance of the middle point *o* from the axis of motion *n p* is greater than the diſtance of *m* from the axis *d h*, and becauſe *o* will therefore deſcribe a portion of a larger circle than *m* does, the rib *n o p* will ſlide up a little under the rib *d m h*, or the rib *d m h* will overlap *n o p* a little more than before; the diſtance *o m* will therefore be diminiſhed. The ſame muſt happen to all the ſuperior ribs; but the change of diſtance will be leſs and leſs as we go upwards. Now, inſtead of this ſuppoſed ſtructure of the ribs overlapping each other, ſuppoſe each inferior rib connected with the one above it by threads or fibres, ſuſceptible of contraction at the will of man. The articulations *e*, *a*, of the firſt or upper rib with the ſpine and ſternum are ſo broad and firm, that this rib can have little or no motion round the line *a e*; this rib therefore is as a fixture for the ends of all the contracting fibres: therefore, whenever the fibres which connect the ſecond rib with the firſt rib contract, the ſecond muſt riſe a little, and alſo go outward, and will carry the lower

Fig. 76.

ribs

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ribs along with it; the third rib will riſe ſtill farther by the contraction of the muſcles which connect it with the ſecond, and ſo on: and thus the whole ribs are raiſed and thrown outward (and a little forward, becauſe the articulation of each with the ſpine is conſiderably higher than that with the ſternum), and the capacity of the thorax is enlarged by the contraction of its muſcular covering. The direction of the muſcular fibres is very oblique to the direction of the circular motion which it produces; from which circumſtance it follows, that a very minute contraction of the muſcles produces all the motion which is neceſſary. This indeed is not great; the whole motion of the loweſt ribs is leſs than an inch in the moſt violent inſpiration, and the whole contraction of the muſcles of the twelve ribs does not exceed the eighth part of an inch, even ſuppoſing the intercoſtal muſcles at right angles to the ribs; and being oblique, the contraction is ſtill leſs (ſee BORELLI, SABATIER, MONRO, &c.). It would ſeem, that the intenſity of the contractive power of a muſcular fibre is eaſily obtained, but that the ſpace through which it can be exerted is very limited; for in moſt caſes nature places the muſcles in ſituations of great mechanical diſadvantage in this reſpect, in order to procure other conveniences.

But this is not the whole effect of the contraction of the intercoſtal muſcles: ſince the compound action of the two ſets of muſcles, which croſs each other from rib to rib like the letter X, is nearly at right angles to the rib, but is oblique to its plane, it tends to puſh the ribs cloſer on their articulations, and thus to preſs out the two pillars on which they are articulated. Thus, ſuppoſing *a f* (fig. 77.) to repreſent the ſection of one of the vertebræ of the ſpine, and *c d* a ſection of the ſternum, and *a b c*, *f e d*, two oppoſite ribs, with a lax thread *b e* connecting them. If this thread be pulled upwards by the middle *g* till it is tight, it will tend to pull the points *b* and *e* nearer to each other, and to preſs the vertebra *a f* and the ſternum *c d* outwards. The ſpine being the chief pillar of the body, may be conſidered as immoveable in the preſent inſtance. The ſternum is ſufficiently ſuſceptible of motion for the preſent purpoſe. It remains almoſt fixed a-top at its articulation with the firſt rib, but it gradually yields below; and thus the capacity of the thorax is enlarged in this direction alſo. The whole enlargement of the diameters of the thorax during inſpiration is very ſmall, not exceeding the fiftieth part of an inch in ordinary caſes. This is eaſily calculated. Its quieſcent capacity is about two cubic feet, and we never draw in more than 15 inches. Two ſpheres, one of which holds 2 cubic feet and the other 2 feet and 15 inches, will not differ in diameter above the fiftieth part of an inch.

Fig. 77.

The other method of enlarging the capacity of the thorax is very different. It is ſeparated from the abdomen by a ſtrong muſcular partition called the *diaphragm*, which is attached to firm parts all around. In its quieſcent or relaxed ſtate it is conſiderably convex upwards, that is, towards the thorax, riſing up into its cavity like the bottom of an ordinary quart bottle, only not ſo regular in its ſhape. Many of its fibres tend from its middle to the circumference, where they are inſerted into firm parts of the body. Now ſuppoſe theſe fibres to contract. This muſt draw down its middle, or make it flatter than before, and thus enlarge the capacity of the thorax.

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Phyſiologiſts are not well agreed as to the ſhare which each of theſe actions has in the operation of enlarging the thorax. Many refuſe all ſhare of it to the intercoſtal muſcles, and ſay that it is performed by the diaphragm alone. But the fact is, that the ribs are really obſerved to riſe even while the perſon is aſleep; and this cannot poſſibly be produced by the diaphragm, as theſe anatomiſts aſſert. Such an opinion ſhows either ignorance or neglect of the laws of pneumatics. If the capacity of the thorax were enlarged only by drawing down the diaphragm, the preſſure of the air would compreſs the ribs, and make them deſcend. And the ſimple laws of mechanics make it as evident as any propoſition in geometry, that the contraction of the intercoſtal muſcles *muſt* produce an elevation of the ribs and enlargement of the thorax; and it is one of the moſt beautiful contrivances of nature. It depends much on the will of the animal what ſhare each of theſe actions ſhall have. In general, the greateſt part is done by the diaphragm; and any perſon can breathe in ſuch a manner that his rib ſhall remain motionleſs; and, on the contrary, he can breathe almoſt entirely by raiſing his cheſt. In the firſt method of breathing, the belly riſes during inſpiration, becauſe the contraction of the diaphragm compreſſes the upper part of the bowels, and therefore ſqueezes them outwards; ſo that an ignorant perſon would be apt to think that the breathing was performed by the belly, and that the belly is inflated with the air. The ſtrait lacing of the women impedes the motion of the ribs, and changes the natural habit of breathing, or brings on an unnatural habit. When the mind is depreſſed, it is obſerved that the breathing is more performed by the muſcles of the thorax; and a deep ſigh is always made in this way.

Theſe obſervations on the manner in which the capacity of the cheſt can be enlarged were neceſſary, before we can acquire a juſt notion of the way in which the mechanical properties of air operate in applying it to the maſs of blood during its paſſage through the lungs. Suppoſe the thorax quite empty, and communicating with the external air by means of the trachea or windpipe, it would then reſemble a pair of bellows. Raiſing the boards correſponds to the raiſing of the ribs; and we might imitate the action of the diaphragm by forcibly pulling outwards the folded leather which unites them. Thus their capacity is enlarged, and the air ruſhes in at the nozzle by its weight in the ſame manner as water would do. The thorax differs from bellows only in this reſpect, that it is filled by the lungs, which is a vaſt collection of little bladders, like the holes in a piece of fermented bread, all communicating with the trachea, and many of them with each other. When the cheſt is enlarged, the air ruſhes into them all in the ſame manner as into the ſingle cavity of an empty thorax. It cannot be ſaid with propriety that they are inflated: all that is done is the *allowing* the air to come in. At the ſame time, as their membranous covering muſt have ſome thickneſs, however ſmall, and ſome elaſticity, it is not unlikely that, when compreſſed by expiration, they tend a little to recover their former ſhape, and thus aid the voluntary action of the muſcles. It is in this manner that a ſmall bladder of caoutchouc

ſwells

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This account of the manner in which the lungs are filled with air does not ſeem agreeable to the notions

349 We take in air not by our own action, but by external preſſure. we entertain of it. We ſeem to ſuck in the air; but although it be true that we act, and exert force, in order to get air into our lungs, it is not by our action, but by external preſſure, that it does come in. If we apply our mouth to the top of a bottle filled with water, we find that no draught, as we call it, of our cheſt will ſuck in any of the water; but if we ſuck in the very ſame manner at the end of a pipe immerſed in water, it follows immediately. Our intereſt in the thing makes us connect in imagination our own action with the effect, without thinking on the many ſteps which may intervene in the train of natural operations; and we conſider the action as the immediate cauſe of the air's reception into the lungs. It is as if we opened the door, and took in by the hand a perſon who was really puſhed in by the crowd without. If an inciſion be made into the ſide of the thorax, ſo that the air can get in by that way, when the animal acts in the uſual manner, the air will really come in by this hole, and fill the ſpace between the lungs and the thorax; but no air is ſucked into the lungs by this proceſs, and the animal is as completely ſuffocated as if the windpipe were ſhut up. And, on the other hand, if a hole be made into the lungs without communicating with the thorax, the animal will breathe through this hole, though the windpipe be ſtopped. This is ſucceſsfully performed in caſes of patients whoſe trachea is ſhut up by accident or by inflammation; only it is neceſſary that this perforation be made into a part of the lungs where it may meet with ſome of the great pulmonary paſſages: for if made into ſome remote part of a lobe, the air cannot find its way into the reſt of the lungs through ſuch narrow paſſages, obſtructed too by blood, &c.

350 Nature of expiration. We have now explained, on pneumatical principles, the proceſs of inſpiration. The expiration is chiefly performed by the natural tone of the parts. In the act of inſpiration the ribs were raiſed and drawn outwards in oppoſition to the elaſticity of the ſolids themſelves; for although the ribs are articulated at their extremities, the articulations are by no means ſuch as to give a free and eaſy motion like the joints of the limbs. This is particularly the caſe in the articulations with the ſternum, which are by no means fitted for motion. It would ſeem that the motion really produced here is chiefly by the yielding of the cartilaginous parts and the bending of the rib; when therefore the muſcles which produced this effect are allowed to relax, the ribs again collapſe. Perhaps this is aſſiſted a little by the action of the long muſcles which come down acroſs the ribs without being inſerted into them. Theſe may draw them together a little, as we compreſs a looſe bundle by a ſtring. [illegible]

In like manner, when the diaphragm was drawn down, it compreſſed the abdomen in oppoſition to the elaſticity of all the viſcera contained in it, and to the elaſticity and tone of the teguments and muſcles which ſurround it. When therefore the inſpiratory force is removed, theſe parts puſh it up again into its natural ſituation, and in doing this expel the air from the lungs.

If this be a juſt account of the matter, expiration should be performed without any effort. This accordingly is the caſe. 351 Expiration requires no effort. We feel that, after having made an ordinary eaſy inſpiration, it requires the continuance of the effort to keep the thorax in this enlarged ſtate, and that all that is neceſſary for expiration is to ceaſe to act. No perſon feels any difficulty in emptying the lungs; but weak people often feel a difficulty of inſpiration, and compare it to the feeling of a weight on their breaſt; and expiration is the laſt motion of the thorax in a dying perſon.

But nature has alſo given us a mechaniſm by which we can expire, namely, the abdominal muſcles; and when we have finiſhed an ordinary and eaſy expiration, we can ſtill expel a conſiderable bulk of air (nearly half of the contents of the lungs) by contracting the abdominal muſcles. Theſe, by compreſſing the body, force up its moveable contents againſt the diaphragm, and cauſe it to riſe further into the thorax, acting in the ſame manner as when we expel the fæces *per anum*. When a perſon breathes out as much air as he can in this manner, he may obſerve that his ribs do not collapſe during the whole operation.

352 A certain quantity of air neceſſary to keep the lungs of a natural ſize. There ſeems then to be a certain natural unconſtrained ſtate of the veſicles of the lungs, and a certain quantity of air neceſſary for keeping them of this ſize. It is probable that this ſtate of the lungs gives the freeſt motion to the blood. Were they more compreſſed, the blood veſſels would be compreſſed by the adjoining veſicles; were they more lax, the veſſels would be more crooked, and by this means obſtructed. The frequent inſpirations gradually change this air by mixing freſh air with it, and, at every expiration carrying off ſome of it. In catarrhs and inflammations, eſpecially when attended with ſuppuration, the ſmall paſſages into the remote veſſels are obſtructed, and thus the renewal of air in them will be prevented. The painful feeling which this occaſions cauſes us to expel the air with violence, ſhutting the windpipe, till we have exerted ſtrongly with the abdominal muſcles, and made a ſtrong compreſſion on the lower part of the thorax. We then open the paſſage ſuddenly, and expel the air and obſtructing matter by violent coughing.

353 Peculiar breathing of birds. We have ſaid, that birds exhibit a curious variety in the proceſs of breathing. The muſcles of their wings being ſo very great, required a very extenſive inſertion, and this is one uſe of the great breaſt-bone. Another uſe of it is, to form a firm partition to hinder the action of theſe muſcles from compreſſing the thorax in the act of flying: therefore the form of their cheſt does not admit of alternate enlargement and contraction to that degree as in land animals. Moreover, the muſcles of their abdomen are alſo very ſmall; and it would ſeem that they are not ſufficient for producing the compreſſion on the bowels which is neceſſary for carrying

carrying

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carrying on the proceſs of concoction and digeſtion. Inſtead of aiding the lungs, they receive help from them.

Fig. 78.

In an oſtrich, the lungs conſiſt of a fleſhy part A, A (fig. 78.), compoſed of veſicles like thoſe of land animals, and, like them, ſerving to expoſe the blood to the action of the air. Beſides theſe, they have on each ſide four large bags B, C, D, E, each of which has an orifice G communicating with the trachea; but the ſecond, C, has alſo an orifice H, by which it communicates with another bag F ſituated below the reſt in the abdomen. Now, when the lungs are compreſſed by the action of the diaphragm the air in C is partly expelled by the trachea through the orifice G, and partly driven through the orifice H into the bag F, which is then allowed to receive it, becauſe the ſame action which compreſſes the lungs enlarges the abdomen. When the thorax is enlarged, the bag C is partly ſupplied with freſh air through the trachea, and partly from the bag F. As the lungs of other animals reſemble a common bellows, the lungs of birds reſemble the ſmith's bellows with a partition; and anatomiſts have diſcovered paſſages from this part of the lungs into their hollow bones and quills. We do not know all the uſes of this contrivance; and only can obſerve, that this alternate action muſt aſſiſt the muſcles of the abdomen in promoting the motion of the food along the alimentary canal, &c. We can diſtinctly obſerve in birds that their belly dilates when the cheſt collapſes, and *vice verſa*, contrary to what we ſee in the land animals. Another uſe of this double paſſage may be to produce a circulation of air in the lungs, by which a compenſation is made for the ſmaller ſurface of action on the blood: for the number of ſmall veſicles, of equal capacity with theſe large bags, gives a much more extenſive ſurface.

If we try to raiſe mercury in a pipe by the action of the cheſt alone, we cannot raiſe it above two or three inches; and the attempt is both painful and hazardous. It is painful chiefly in the breaſt, and it provokes coughing. Probably the fluids ooze through the pores of the veſicles by the preſſure of the ſurrounding parts.

On the other hand, we can by expiration ſupport mercury about five or ſix inches high: but this alſo is very painful, and apt to produce extravaſation of blood. This ſeems to be done entirely by the abdominal muſcles.

354 The operation of ſucking,

The operation properly termed SUCKING is totally different from breathing, and reſembles exceedingly the action of a common pump. Suppoſe a pipe held in the mouth, and its lower end immerſed in water. We fill the mouth with the tongue, bringing it forward, and applying it cloſely to the teeth and to the palate; we then draw it back, or bend it downwards (behind) from the palate, thus leaving a void. The preſſure of the air on the cheeks immediately depreſſes them, and applies them cloſe to the gums and teeth; and its preſſure on the water in the veſſel cauſes it to riſe through the pipe into the empty part of the mouth, which it quickly fills. We then puſh forward the tip of the tongue, below the water, to the teeth, and apply it to them all round, the water being above the tongue, which is kept much depreſſed. We then apply the tongue to the palate, beginning at the tip, and gradually going backwards in this application. By this means the water is gradually forced backward by an operation ſimilar to that of the gullet in ſwallowing. This is done by contracting the gullet above and relaxing it below, juſt as we would empty a gut of its contents by drawing our cloſed hand along it. By this operation the mouth is again completely occupied by the tongue, and we are ready for repeating the operation. Thus the mouth and tongue reſemble the barrel and piſton of a pump; and the application of the tip of the tongue to the teeth performs the office of the valve at the bottom of the barrel, preventing the return of the water into the pipe. Although uſual, it is not abſolutely neceſſary, to withdraw the tip of the tongue, making a void before the tongue. Sucking may be performed by merely ſeparating the tongue gradually from the palate, beginning at the root. If we withdraw the tip of the tongue a very minute quantity, the water gets in and flows back above the tongue.

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The action of the tongue in this operation is very powerful; ſome perſons can raiſe mercury 25 inches: but this ſtrong exertion is very fatiguing, and the ſoft parts are prodigiouſly ſwelled by it. It cauſes the blood to ooze plentifully through the pores of the tongue, fauces, and palate, in the ſame manner as if a cupping-glaſs and ſyringe were applied to them; and, when the inſide of the mouth is excoriated or tender, as is frequent with infants, even a very moderate exertion of this kind is accompanied with extravaſation of blood. When children ſuck the nurſe's breaſt, the milk follows their exertion by the preſſure of the air on the breaſt; and a weak child, or one that withholds its exertions on account of pain from the above mentioned cauſe, may be aſſiſted by a gentle preſſure of the hand on the breaſt: the infant pupil of nature, without any knowledge of pneumatics, frequently helps itſelf by preſſing its face to the yielding breaſt.

In the whole of this operation the breathing is performed through the noſtrils; and it is a prodigious diſtreſs to an infant when this paſſage is obſtructed by mucus. We beg to be forgiven for obſerving by the way, that this obſtruction may be almoſt certainly removed for a little while, by rubbing the child's noſe with any liquid of quick evaporation, or even with water.

355 and of drinking, which is very ſimilar.

The operation in drinking is not very different from that in ſucking: we have indeed little occaſion here to ſuck, but we muſt do it a little. Dogs and ſome other animals cannot drink, but only lap the water into their mouths with their tongue, and then ſwallow it. The gallinaceous birds ſeem to drink very imperfectly; they ſeem merely to dip their head into the water up to the eyes till their mouth is filled with water, and then holding up the head, it gets into the gullet by its weight, and is then ſwallowed. The elephant drinks in a very complicated manner; he dips his trunk into the water, and fills it by making a void in his mouth: this he does in the contrary way to man. After having depreſſed his tongue, he begins the application of it to the palate at the root, and by extending the application forward, he expels the air by the mouth which came into it from the trunk. The proceſs here is not very unlike that of the condenſing ſyringe without a piſton valve, deſcribed in N° 58. in which the external air (correſponding here to the air in the trunk) enters by the hole F in the ſide, and is expelled through the hole in the end of the barrel; by this operation the trunk is filled with water; then he lifts his trunk out of the water, and bringing it to his mouth, pours the contents into it, and ſwallows it. On conſidering this operation, it appears that, by the

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the ſame proceſs by which the air of the trunk is taken into the mouth, the water could alſo be taken in, to be afterwards ſwallowed: but we do not find, upon inquiry, that this is done by the elephant; we have always obſerved him to drink in the manner now deſcribed. In either way it is a double operation, and cannot be carried on any way but by alternately ſucking and ſwallowing, and while one operation is going on the other is interrupted; whereas man can do both at the ſame time. Nature ſeems to delight in exhibiting to rational obſervers her inexhauſtible variety of reſource; for many inſects, which drink with a trunk, drink without interruption: yet we do not call in queſtion the truth of the aphoriſm, *Natura maxime ſimplex et ſemper ſibi conſona*, nor doubt but that, if the whole of her purpoſe were ſeen, we ſhould find that her procedure is the ſimpleſt poſſible: for Nature, or Nature's God, is wiſe above our wiſeſt thoughts, and ſimplicity is certainly the eſſence of wiſdom: but alas! it is generally but a ſmall and the moſt obvious part of her purpoſe that we can obſerve or appreciate. We ſeldom ſee this ſimplicity of nature [illegible] to us, except by ſome ſyſtem-maker, who has found a principle which tolerably tallies with a conſiderable variety of phenomena, and then cries out, *Fruſtra fit per plura quod fieri poteſt per pauciora*.

356 Mode of keeping up a continued blaſt with a blow-pipe.

There is an operation ſimilar to that of the elephant, which many find a great difficulty in acquiring, viz. keeping up a continued blaſt with a blow-pipe. We would deſire our chemical reader to attend minutely to the gradual action of his tongue in ſucking, and he will find it ſuch as we have deſcribed. Let him attend particularly to the way in which the tip of the tongue performs the office of a valve, preventing the return of the water into the pipe: the ſame poſition of the tongue would hinder air from coming into the mouth. Next let him obſerve, that in ſwallowing what water he has now got lodged above his tongue, he continues the tip of the tongue applied to the teeth; now let him ſhut his mouth, keeping his lips firm together, the tip of the tongue at the teeth, and the whole tongue forcibly kept at a diſtance from the palate; bring up the tongue to the palate, and allow the tip to ſeparate a little from the teeth, this will expel the air into the ſpace between the fauces and cheeks, and will blow up the cheeks a little: then, acting with the tip of the tongue as a valve, hinder this air from getting back, and depreſſing the tongue again, more air (from the noſtrils) will get into the mouth, which may be expelled into the ſpace without the teeth as before, and the cheeks will be more inflated: continue this operation, and the lips will no longer be able to retain it, and it will ooze through as long as the operation is continued. When this has become familiar and eaſy, take the blow-pipe, and there will be no difficulty in maintaining a blaſt as uniform as a ſmith's bellows, breathing all the while through tbe noſtrils. The only difficulty is the holding the pipe: this fatigues the lips; but it may be removed by giving the pipe a convenient ſhape, a pretty flat oval, and wrapping it round with leather or thread.

357 Nature of the land and ſea breeze in warm countries.

Another phenomenon depending on the principles already eſtabliſhed, is the land and ſea breeze in the warm countries.

We have ſeen that air expands exceedingly by heat; therefore heated air, being lighter than an equal bulk of cold air, muſt riſe in it. If we lay a hot ſtone in the ſunſhine in a room, we ſhall obſerve the ſhadow of the [illegible] [illegible] [illegible] [illegible] ed, and will warm the [illegible]. [illegible], this effect will be [illegible] be-cauſe the inclined ſides of the hills will receive the light more directly: the [illegible] warmed: the heated air will riſe, and that in the middle will riſe [illegible]; and [illegible] will begin, which muſt be ſupplied by air coming in from all ſides, to be heated and to riſe in its turn; and thus the [illegible] is produced, and continues all day. This current will [illegible] night, by the air cooling and [illegible] the hills, and we ſhall have the *land-breeze*.

358 [illegible] of air in mines.

It is owing to the [illegible] tion of air in mines which have the [illegible] at their ſhafts of unequal heights. The temperature under ground is pretty conſtant through the whole year, while that of the atmoſphere is extremely variable. Now, ſuppoſe a mine having a long horizontal drift, communicating between two pits or ſhafts, and that one of theſe ſhafts terminates in a valley, [illegible] of a hill perhaps [illegible]. [illegible] poſe it [illegible], and the air [illegible] the temperature of the earth is [illegible] the temperature of the air in the [illegible] and the drift. Now, [illegible] by one degree of heat, we [illegible] at the bottom of the two [illegible] part of the weight of a [illegible] (100 [illegible] the ſhafts). This will be [illegible] feet of the [illegible]. If [illegible] be continued, it would [illegible] air down the long ſhafts, along the drift, and up the ſhort ſhaft. The weight of the air [illegible] feet would communicate to it the velocity of [illegible] per ſecond: divide this by $\sqrt{20}$, that is, by 4.5, and we ſhall have [illegible] feet per ſecond [illegible] the velocity of what is called a briſk gale. This preſſure would be continued, if the [illegible] long ſhaft were cooled and [illegible] in; but this is not the caſe. [illegible] and [illegible] and a current is produced [illegible] an abundant circulation of air along the whole paſſage; and care is taken to [illegible] the paſſages in ſuch a manner that no part of the mine is out of the [illegible]. When any [illegible] the renewal of air at its extremity becomes more imperfect as it advances: and when it is carried a certain length, the air ſtagnates and becomes ſuffocating, till either a communication can be made with the reſt of the mine, or a [illegible] at the end of this [illegible].

As this current [illegible] entirely on the difference of temperature between the air below and that above, it muſt ceaſe when this difference ceaſes. Accordingly, in the ſpring and autumn [illegible] in ſummer [illegible] from the deep pits to the [illegible], [illegible] in the [illegible] a current from the ſhallow pits to the deep ones. It frequently happens alſo, that in mineral countries the chemical changes which are going on in different parts of the earth make differences of temperature ſufficient to produce a ſenſible current.

It is eaſy to ſee that the ſame cauſes muſt produce a current down our chimneys in ſummer. The chimney is colder than the ſummer air, and muſt therefore condenſe it, and it will come down and run out at the doors and windows.

359 The nature of what is called the draught in chimneys.

And this naturally leads us to conſider a very important effect of the expanſion and conſequent aſcent of air by heat, namely the drawing (as it is called) of chimneys. The air which has contributed to the burning of fuel muſt be intenſely heated, and will riſe in the atmoſphere. This will alſo be the caſe with much of the ſurrounding air which has come very near the fire, although not in contact with it. If this heated air be made to riſe in a pipe, it will be kept together, and therefore will not ſoon cool and collapſe: thus we ſhall obtain a long column of light air, which will riſe with a force ſo much the greater as the column is longer or more heated. Therefore the taller we make the chimney, or the hotter we make the fire, the more rapid will be the current, or the draught or ſuction, as it is injudiciouſly called, will be ſo much the greater. The aſcenſional force is the difference between the weight of the column of heated air in the funnel and a column of the ſurrounding atmoſphere of equal height. We increaſe the draught, therefore, by increaſing the perpendicular height of the chimney. Its length in a horizontal direction gives no increaſe, but, on the contrary, diminiſhes the draught by cooling the air before it gets into the effective part of the funnel. We increaſe the draught alſo by obliging all the air which enters the chimney to come very near the fuel; therefore a low mantle-piece will produce this effect; alſo filling up all the ſpaces on each ſide of the grate. When much air gets in above the fire, by having a lofty mantle-piece, the general maſs of air in the chimney cannot be much heated. Hence it muſt happen that the greateſt draught will be produced by bringing down the mantle-piece to the very fuel; but this converts a fire-place into a furnace, and by thus ſending the whole air through the fuel, cauſes it to burn with great rapidity, producing a prodigious heat; and this producing an increaſe of aſcenſional force, the current becomes furiouſly rapid, and the heat and conſumption of fuel immenſe. If the fire-place be a cube of a foot and a half, and the front cloſed by a door, ſo that all the air muſt enter through the bottom of the grate, a chimney of 15 or 20 feet high, and ſufficiently wide to give paſſage to all the expanded air which can paſs through the fire, will produce a current which will roar like thunder, and a heat ſufficient to run the whole inſide into a lump of glaſs.

All that is neceſſary, however, in a chamber fire-place, is a current ſufficiently great for carrying up the ſmoke and vitiated air of the fuel. And as we want alſo the enlivening flutter and light of the fire, we give the chimney-piece both a much great height and width than what is merely neceſſary for carrying up the ſmoke, only wiſhing to have the current ſufficiently determinate and ſteady for counteracting any occaſional tendency which it may ſometimes have to come into the room. By allowing a greater quantity of air to get into the chimney, heated only to a moderate degree, we produce a more rapid renewal of the air of the room: did we oblige it to come ſo much nearer the fire as to produce the ſame renewal of the air in conſequence of a more rapid current, we ſhould produce an inconvenient heat. But in this country, where pit-coal is in general ſo very cheap, we carry this indulgence to an extreme; or rather we have not ſtudied how to get all the deſired advantages with economy. A much ſmaller renewal of air than we commonly produce is abundantly wholeſome and pleaſant, and we may have all the pleaſure of the light and flame of the fuel at much leſs expence, by contracting greatly the paſſage into the vent. The beſt way of doing this is by contracting the brick-work on each ſide behind the mantle-piece, and reducing it to a narrow parallelogram, having the back of the vent for one of its long ſides. Make an iron plate to fit this hole, of the ſame length, but broader, ſo that it may lie ſloping, its lower edge being in contact with the foreſide of the hole, and its upper edge leaning on the back of the vent. In this poſition it ſhuts the hole entirely. Now let the plate have a hinge along the front or lower edge, and fold up like the lid of a cheſt. We ſhall thus be able to enlarge the paſſage at pleaſure. In a fire-place fit for a room of 24 feet by 18, if this plate may be about 18 inches long from ſide to ſide, and folded back within an inch or an inch and a half of the wall, this will allow paſſage for as much air as will keep up a very cheerful fire: and by raiſing or lowering this **Register**, the fire may be made to burn more or leſs rapidly. A free paſſage of half an inch will be ſufficient in weather that is not immoderately cold. The principle on which this conſtruction produces its effect is, that the air which is in the front of the fire, and much warmed by it, is not allowed to get into the chimney, where it would be immediately hurried up the vent, but riſes up to the ceiling and is diffuſed over the whole room. This double motion of the air may be diſtinctly obſerved by opening a little of the door and holding a candle in the way. If the candle be held near the floor, the flame will be blown into the room; but if held near the top of the door, the flame will be blown outward.

360 Deſcription of a ſtove-grate or chapelle.

But the moſt perfect method of warming an apartment in the temperate climates, where we can indulge in the cheerfulneſs and ſweet air produced by an open fire, is what we call a ſtove-grate, and our neighbours on the continent call a chapelle, from its reſemblance to the chapels or oratories in the great churches.

In the great chimney-piece, which, in this caſe, may be made even larger than ordinary, is ſet a ſmaller one fitted up in the ſame ſtile of ornament, but of a ſize no greater than is ſufficient for holding the fuel. The ſides and back of it are made of iron (caſt iron is preferable to hammered iron, becauſe it does not ſo readily calcine), and are kept at a ſmall diſtance from the ſides and back of the main chimney-piece, and are continued down to the hearth, ſo that the aſh-pit is alſo ſeparated. The pipe or chimney of the ſtove grate is carried up behind the ornaments of the mantle-piece till it riſes above the mantle-piece of the main chimney-piece, and is fitted with a regiſter or damper-plate turning round a traverſe axis. The beſt form of this regiſter is that which we have recommended for an ordinary fire-place, having its axis or joint cloſe at the front; ſo that when it is open or turned up, the burnt

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air and ſmoke ſtriking it obliquely, are directed with certainty into the vent, without any riſk of reverberating and coming out into the room. All the reſt of the vent is ſhut up by iron plates or brick-work out of ſight.

361 Effect of its conſtruction.

The effect of this conſtruction is very obvious. The fuel, being in immediate contact with the back and ſides of the grate, heats them to a great degree, and they heat the air contiguous to them. This heated air cannot get up the vent, becauſe the paſſages above theſe ſpaces are ſhut up. It therefore comes out into the room; ſome of it goes into the real fire-place and is carried up the vent, and the reſt riſes to the ceiling and is diffuſed over the room.

It is ſurpriſing to a perſon who does not conſider it with ſkill how powerfully this grate warms a room. Leſs than one-fourth of the fuel conſumed in an ordinary fire-place is ſufficient; and this with the ſame cheerful blazing hearth and ſalutary renewal of air. It even requires attention to keep the room cool enough. The heat communicated to thoſe parts in contact with the fuel is needleſsly great; and it will be a conſiderable improvement to line this part with very thick plates of caſt iron, or with tiles made of fire-clay which will not crack with the heat. Theſe, being very bad conductors, will make the heat, ultimately communicated to the air, very moderate. If, with all theſe precautions, the heat ſhould be found too great, it may be brought under perfect management by opening paſſages into the vent from the lateral ſpaces. Theſe may be valves or trap-doors moved by rods concealed behind the ornaments.

Thus we have a fire-place under the moſt complete regulation, where we can always have a cheerful fire without being for a quarter of an hour incommoded by the heat; and we can as quickly raiſe our fire, when too low, by hanging on a plate of iron on the front, which ſhall reach as low as the grate. This in five minutes will blow up the fire into a glow; and the plate may be ſent out of the room, or ſet behind the ſtove-grate out of ſight.

The propriety of incloſing the aſh-pit is not ſo obvious; but if this be not done, the light aſhes, not finding a ready paſſage up the chimney, will come out into the room along with the heated air.

We do not conſider in this place the various extraneous circumſtances which impede the current of air in our chimneys and produce ſmoky houſes: theſe will be treated of, and the methods of removing or remedying them, under the article SMOKE. We conſider at preſent only the theory of this motion in general, and the modifications of its operation ariſing from the various purpoſes to which it may be applied.

362 Mode of warming apartments by ſtoves.

Under this head we ſhall next give a general account and deſcription of the method of warming apartments by ſtoves. A STOVE in general is a fire-place ſhut up on all ſides, having only a paſſage for admitting the air to ſupport the fire, and a tube for carrying off the vitiated air and ſmoke; and the air of the room is warmed by coming into contact with the outſide of the ſtove and flue. The general principle of conſtruction, therefore, is very ſimple. The air muſt be made to come into as cloſe contact as poſſible with the fire, or even to paſs through it, and this in ſuch quantities as juſt to conſume a quantity of fuel ſufficient for producing the heat required, and the ſtove muſt be ſo conſtructed, that both the burning fuel and the air which has been heated by it ſhall be applied to as extenſive a ſurface as poſſible of furnace, all in contact with the air of the room; and the heated air within the ſtove muſt not be allowed to get into the funnel which is to carry it off till it is too much cooled to produce any conſiderable heat on the outſide of the ſtove.

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In this temperate climate no great ingenuity is neceſſary for warming an ordinary apartment; and ſtoves are made rather to pleaſe the eye as furniture than as economical ſubſtitutes for an open fire of equal calorific power. But our neighbours on the continent, and eſpecially towards the north, where the cold of winter is intenſe and fuel very dear, have beſtowed much attention on their conſtruction, and have combined ingenious economy with every elegance of form. Nothing can be handſomer than the ſtoves of Fayencerie that are to be ſeen in French Flanders, or the Ruſſian ſtoves at St Peterſburgh, finiſhed in ſtucco. Our readers will not, therefore, be diſpleaſed with a deſcription of them. In this place, however, we ſhall only conſider a ſtove in general as a ſubject of pneumatical diſcuſſion, and we refer our readers to the article STOVE for an account of them as articles of domeſtic accommodation.

363 General form of a ſtove.

The general form, therefore, of a ſtove, and of which all others are only modifications adapted to circumſtances of utility or taſte, is as follows:

Fig. 79.

MIKL (fig. 79.) is a quadrangular box of any ſize in the directions MILK. The inſide width from front to back is pretty conſtant, never leſs than ten inches, and rarely extending to 20; the included ſpace is divided by a great many partitions. The loweſt chamber AB is the receptacle for the fuel, which lies on the bottom of the ſtove without any grate; this fire-place has a door AO turning on hinges, and in this door is a very ſmall wicket P: the roof of the fire-place extends to within a very few inches of the farther end, leaving a narrow paſſage B for the flame. The next partition *c* C is about eight inches higher, and reaches almoſt to the other end, leaving a narrow paſſage for the flame at C. The partitions are repeated above, at the diſtance of eight inches, leaving paſſages at the ends, alternately diſpoſed as in the figure; the laſt of them H communicates with the room vent. This communication may be regulated by a plate of iron, which can be ſlid acroſs it by means of a rod or handle which comes through the ſide. The more uſual way of ſhutting up this paſſage is by a ſort of pan or bowl of earthen ware, which is whelmed over it with its brim reſting in ſand contained in a groove formed all round the hole. This damper is introduced by a door in the front, which is then ſhut. The whole is ſet on low pillars, ſo that its bottom may be a few inches from the floor of the room: it is uſually placed in a corner, and the apartments are ſo diſpoſed that their chimneys can be joined in ſtacks as with us.

Some ſtraw or wood ſhavings are firſt burnt on the hearth at its farther end. This warms the air in the ſtove, and creates a determined current. The fuel is then laid on the hearth cloſe by the door, and pretty much piled up. It is now kindled; and the current being already directed to the vent, there is no danger of any ſmoke coming out into the room. [illegible] to prevent this, the door is ſhut, and the wicket P opened.

ed.

[illegible]

ed. The air ſupplied by this, being directed to the middle or bottom of the fuel, quickly kindles it, and the operation goes on.

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Aim and effects of this conſtruction.

The aim of this conſtruction is very obvious. The flame and heated air are retained as long as poſſible within the body of the ſtove by means of the long paſſages; and the narrowneſs of theſe paſſages obliges the flame to come in contact with every particle of ſoot, ſo as to conſume it completely, and thus convert the whole combuſtible matter of the fuel into heat. For want of this a very conſiderable portion of our fuel is waſted by our open fires, even under the very beſt management: the ſoot which ſticks to our vents is very inflammable, and a pound weight of it will give as much if not more heat than a pound of coal. And what ſticks to our vents is very inconſiderable in compariſon with what eſcapes unconſumed at the chimney top. In fires of green wood, peat, and ſome kinds of pit-coal, nearly one-fifth of the fuel is loſt in this way; but in theſe ſtoves there is hardly ever any mark of ſoot to be ſeen; and even this ſmall quantity is produced only after lighting the fires. The volatile inflammable matters are expelled from parts much heated indeed, but not ſo hot as to burn; and ſome of it charred or half burnt cannot be any further conſumed, being enveloped in flame and air already vitiated and unfit for combuſtion. But when the ſtove is well heated, and the current briſk, no part of the ſoot eſcapes the action of the air.

The hot air retained in this manner in the body of the ſtove is applied to its ſides in a very extended ſurface. To increaſe this ſtill more, the ſtove is made narrower from front to back in its upper part; a certain breadth is neceſſary below, that there may be room for fuel. If this breadth were preſerved all the way up, much heat would be loſt, becauſe the heat communicated to the partitions of the ſtove does no good. By diminiſhing their breadth, the proportion of uſeful ſurface is increaſed. The whole body of the ſtove may be conſidered as a long pipe folded up, and its effect would be the greateſt poſſible if it really were ſo; that is, if each partition *c* C, *d* D, &c. were ſplit into two, and a free paſſage allowed between them for the air of the room. Something like this will be obſerved afterwards in ſome German ſtoves.

It is with the ſame view of making an extenſive application of a hot ſurface to the air, that the ſtove is not built in the wall, not even in contact with it, nor with the floor: for by its detached ſituation, the air in contact with the back, and with the bottom (where it is hotteſt), is warmed, and contributes at leaſt one half of the whole effect; for the great heat of the bottom makes its effect on the air of the room at leaſt equal to that of the two ends. Sometimes a ſtove makes part of the wall between two ſmall rooms, and is found ſufficient.

It muſt be remarked, on the whole, that the effect of a ſtove depends much on keeping in the room the air already heated by it. This is ſo remarkably the caſe, that a ſmall open fire in the ſame room will be ſo far from increaſing its heat, that it will greatly diminiſh it: it will even draw the warm air from a ſuite of adjoining apartments. This is diſtinctly obſerved in the houſes of the Engliſh merchants in St Peterſburgh: their habits of life in Britain make them uneaſy without an open fire in their ſitting rooms; and this obliges them to heat all their ſtoves twice a-day, and their houſes are cooler than thoſe of the Ruſſians who heat them only once. In many German houſes, eſpecially of the lower claſs, the fire place of the ſtove does not open into the room, but into the yard or a lobby, where all the fires are lighted and tended; by this means is avoided the expence of warm air which muſt have been carried off by the ſtove: but it is evident, that this muſt be very unpleaſant, and cannot be wholeſome. We muſt breathe the ſame quantity of ſtagnant air loaded with all the vapours and exhalations which muſt be produced in every inhabited place. Going into one of theſe houſes from the open air, is like putting one's head into a ſtew-pan or under a pie-cruſt, and quickly nauſeates us who are accuſtomed to freſh air and cleanlineſs. In theſe countries it is a matter almoſt of neceſſity, to fumigate the rooms with frankincenſe and other gums burnt. The cenſer in ancient worſhip was in all probability an utenſil introduced by neceſſity for ſweetening or rendering tolerable the air of a crowded place: and it is a conſtant practice in the Ruſſian houſes for a ſervant to go round the room after dinner, waving a cenſer with ſome gums burning on bits of charcoal.

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365
Of hot walls in gardening, &c.

The account now given of ſtoves for heating rooms, and of the circumſtances which muſt be attended to in their conſtruction, will equally apply to hot walls in gardening, whether within or without doors. The only new circumſtance which this employment of a flue introduces, is the attention which muſt be paid to the equability of the heat, and the gradation which muſt be obſerved in different parts of the building. The heat in the flue gradually diminiſhes as it recedes from the fire place, becauſe it is continually giving out heat to the flue. It muſt therefore be ſo conducted through the building by frequent returns, that in every part there may be a mixture of warmer and cooler branches of the flue, and the final chimney ſhould be cloſe by the fire-place. It would, however, be improper to run the flue from the end of the floor up to the ceiling, where the ſecond horizontal pipe would be placed, and then return it downward again and make the third horizontal flue adjoining to the firſt, &c. This would make the middle of the wall the coldeſt. If it is the flue of a greenhouſe, this would be highly improper, becauſe the upper part of the wall can be very little employed; and in this caſe it is better to allow the flue to proceed gradually up the wall in its different returns, by which the loweſt part would be the warmeſt, and the heated air will aſcend among the pots and plants; but in a hot wall, where the trees are to receive heat by contact, ſome approximation to the above method may be uſeful.

In the hypocauſta and ſudaria of the Greeks and Romans, the flue was conducted chiefly under the floors.

366
Malt-kilns a ſpecies of ſtove.

Malt-kilns are a ſpecies of ſtove which merit our attention. Many attempts have been made to improve them on the principle of flue ſtoves; but they have been unſucceſsful, becauſe heat is not what is chiefly wanted in malting: it is a copious current of very dry air to carry off the moiſture. We muſt refer the examination of this ſubject alſo to the article STOVE, and proceed to conſider the current of heated air in the chief varieties of furnaces.

367
Of the current of air in melting furnaces.

All that is to be attended to in the different kinds of melting furnaces is, that the current of air be ſufficiently rapid, and that it be applied in as extenſive a ſurface as poſſible

Effects of Air' preſſure.

poſſible to the ſubſtance to be melted. The more rapid the current it is the hotter, becauſe it is conſuming more fuel; and therefore its effect increaſes in a higher proportion than its rapidity. It is doubly effectual if twice as hot; and if it then be twice as rapid, there is twice the quantity of doubly hot air applied to the ſubject; it would therefore be four times more powerful. This is promoted by raiſing the chimney of the furnace to a great height. The [illegible] it to the [illegible] can hardly be laid down in general terms, becauſe it depends on the preciſe circumſtances of each caſe.

368 In reverberatory furnaces,

In reverberatory furnaces, ſuch as refining furnaces for gold, ſilver, and copper, the flame is made to play over the ſurface of the melted metal. This is procured entirely by the form of the furnace, by making the arch of the furnace as low as the circumſtances of the manipulation will allow. See FURNACE. Experience has pointed out in general the chief circumſtances of their conſtruction, viz. that the fuel ſhould be at one end on a grate, through which the air enters to maintain the fire; and that the metal ſhould be placed on a level floor between the fuel and the tall chimney which produces the current. But there is no kind of furnace more variable in its effect, and almoſt every place has a ſmall peculiarity of conſtruction, on which its pre-eminence is reſted. This has occaſioned many whimſical varieties in their form. This uncertainty ſeems to depend much on a circumſtance rather foreign to our preſent purpoſe; but as we do not obſerve it taken notice of by mineralogical writers, we beg leave to mention it here. It is not heat alone that is wanted in the refining of ſilver by lead, for inſtance. We muſt make a continual application to its ſurface of air, which has not contributed to the combuſtion of the fuel. Any quantity of the hotteſt air, already ſaturated with the fuel, may play on the ſurface of the metal for ever, and keep it in the ſtate of moſt perfect fuſion, but without refining it in the leaſt. Now, in the ordinary conſtruction of a furnace, this is much the caſe. If the whole air has come in by the grate, and paſſed through the middle of the fuel, it can hardly be otherwiſe than nearly ſaturated with it; and if air be alſo admitted by the door (which is generally done or ſomething equivalent), the pure air lies above the vitiated air, and during the paſſage along the horizontal part of the furnace, and along the ſurface of the metal, it ſtill keeps above it, at leaſt there is nothing to promote their mixture. Thus the metal does not come into contact with air fit to act on the baſe metal and calcine it, and the operation of refining goes on ſlowly. Trifling circumſtances in the form of the arch or canal may tend to promote the jumbling of the airs together, and thus render the operation more expeditious; and as theſe are but ill underſtood, or perhaps this circumſtance not attended to, no wonder that we ſee theſe conſidered as ſo many noſtrums of great importance. It were therefore worth while to try the effect of changes in the form of the roof directed to this very circumſtance. Perhaps ſome little prominence down from the arch of the reverberatory would have this effect, by ſuddenly throwing the current into confuſion. If the additional length of paſſage do not cool the air too much, we ſhould think that if there were interpoſed between the fuel and the refining floor a paſſage twiſted like a corkſcrew, making juſt half a turn, it would be moſt [illegible] imagine, that the two airs, keeping each to their reſpective ſides of the paſſage would by this means be turned upſide down, and that the pure ſtratum would now be in contact with the metal, and the vitiated air would be above it.

369 In glaſshouſe furnaces.

The glaſshouſe furnace exhibits the third variety in the management of the current of heated air. In this furnace it is neceſſary that the hole at which the workmen [illegible] furnace. This [illegible] had a chimney, [illegible] holes: for in this caſe cold air would [illegible] in at the hole, play over the ſurface of the pot, and go up the chimney. To prevent this the hole itſelf is made the chimney; but as this would be too ſhort, and would produce very little current and very little heat, the whole furnace is ſet under a tall dome. Thus the heated air from the real furnace is confined in this dome, and conſtitutes a high column of very light air, which will therefore riſe with great force up the dome, and eſcape at the top. The dome is therefore the chimney, and will produce a draught or current proportioned to its height. Some are raiſed above a hundred feet. When all the doors of this houſe are ſhut, and thus no ſupply given except through the fire, the current and heat become prodigious. This, however, cannot be done, becauſe the workmen are in this chimney, and muſt have reſpirable air. But notwithſtanding this ſupply by the houſe-doors, the draught of the real furnace is vaſtly increaſed by the dome, and a heat produced ſufficient for the work, and which could not have been produced without the dome.

370 Improvement of Mr Cotterel for melting iron from the ore.

This has been applied with great ingenuity and effect to a furnace for melting iron from the ore, and an iron finery, both without a blaſt. The common blaſt iron furnace is well known. It is a tall cone with the apex undermoſt. The ore and fluxes are thrown into this cone mixed intimately with the fuel till it is full, and the blaſt of moſt powerful bellows is directed into the bottom of this cone through a hole in the ſide. The air is thrown in with ſuch force, that it makes its way through the maſs of matter, kindles the fuel in its paſſage, and fluxes the materials, which then drop down into a receptacle below the blaſt-hole, and thus the paſſage for the air is kept unobſtructed. It was thought impoſſible to produce or maintain this current without bellows; but Mr Cotterel, an ingenious founder, tried the effect of a tall dome placed over the mouth of the furnace, and though it was not half the height of many glaſshouſe domes it had the deſired effect. Conſiderable difficulties, however, occurred; and he had not ſurmounted them all when he left the neighbourhood of Edinburgh, nor have we ſince heard that he has brought the invention to perfection. It is extremely difficult to place the holes below, at which the air is to enter, at ſuch a preciſe height as neither to be choked by the melted matter, nor to leave ore and ſtones below them unmelted; but the invention is very ingenious, and will be of immenſe ſervice if it can be perfected; for in many places iron ore is to be found where water cannot be had for working a blaſt furnace.

The laſt application which we ſhall make of the currents produced by heating the air is to the freeing mines, ſhips, priſons, &c. from the damp and noxious vapours which frequently infeſt them.

371
Currents of air applied to free mines, ſhips, priſons, &c. of noxious air.

As a drift or work is carried on in the mine, let a trunk of deal boards, about 6 or 8 inches ſquare, be laid along the bottom of the drift, communicating with a trunk carried up in the corner of one of the ſhafts. Let the top of this laſt trunk open into the aſh-pit of a ſmall furnace, having a tall chimney. Let fire be kindled in the furnace; and when it is well heated, ſhut the fire-place and aſh-pit doors. There being no other ſupply for the current produced in the chimney of this furnace, the air will flow into it from the trunk, and will bring along with it all the offenſive vapours. This is the moſt effectual method yet found out. In the ſame manner may trunks be conducted into the aſh-pit of a furnace from the cells of a priſon or the wards of an hoſpital.

372
Air neceſſary for the combuſtion of fuel.

In the account which we have been giving of the management of air in furnaces and common fires, we have frequently mentioned the immediate application of air to the burning fuel as neceſſary for its combuſtion. This is a general fact. In order that any inflammable body may be really inflamed, and its combuſtible matter conſumed and aſhes produced, it is not enough that the body be made hot. A piece of charcoal incloſed in a box of iron may be kept red hot for ever, without waſting its ſubſtance in the ſmalleſt degree. It is farther neceſſary that it be in contact with a particular ſpecies of air, which conſtitutes about three-fourths of the air of the atmoſphere, viz. the vital air or oxygen of Lavoiſier. It was called *empyreal air* by Scheele, who firſt obſerved its indiſpenſable uſe in maintaining fire: and it appears, that, in contributing to the combuſtion of an inflammable body, this air combines with ſome of its ingredients, and becomes fixed air, ſuffering the ſame change as by the breathing of animals. Combuſtion may therefore be conſidered as a ſolution of the inflammable body in air. This doctrine was firſt promulgated by the celebrated Dr Hooke in his *Micrographia*, publiſhed in 1660, and afterwards improved in his treatiſe on Lamps. It is now completely eſtabliſhed, and conſidered as a new diſcovery. It is for this reaſon, that in fire-places of all kinds we have directed the conſtruction, ſo as to produce a cloſe application of the air to the fuel. It is quite needleſs at this day to enter into the diſcuſſions which formerly occupied philoſophers about the manner in which the preſſure and elaſticity of the air promoted combuſtion. Many experiments were made in the 17th century by the firſt members of the Royal Society, to diſcover the office of air in combuſtion. It was thought that the flame was extinguiſhed in rare air for want of a preſſure to keep it together; but this did not explain its extinction when the air was not renewed. Theſe experiments are ſtill retained in courſes of experimental philoſophy, as they are judiciouſly ſtyled; but they give little or no information, nor tend to the illuſtration of any pneumatical doctrine; they are therefore omitted in this place. In ſhort, it is now fully eſtabliſhed, that it is not a mechanical but a chemical phenomenon. We can only inform the chemiſt, that a candle will conſume faſter in the low countries than in the elevated regions of Quito and Gondar, becauſe the air is nearly one half denſer below, and will act proportionally faſter in decompoſing the candle.

373
Curious effect of the air's preſſure.

We ſhall conclude this part of our ſubject with the explanation of a curious phenomenon obſerved in many places. Certain ſprings or fountains are obſerved to have periods of repletion and ſcantineſs, or ſeem to ebb and flow at regular intervals; and ſome of theſe periods are of a complicated nature. Thus a well will have ſeveral returns of high and low water, the difference of which gradually increaſes to a maximum, and then diminiſhes, juſt as we obſerve in the ocean. A very ingenious and probable explanation of this has been given in N° 424. of the Philoſophical Tranſactions, by Mr Atwell, as follows.

Fig. 80.

Let ABCD (fig. 80.) repreſent a cavern, into which water is brought by the ſubterraneous paſſage OT. Let it have an outlet MNP, of a crooked form, with its higheſt part N conſiderably raiſed above the bottom of the cavern, and thence ſloping downwards into lower ground, and terminating in an open well at P. Let the dimenſions of this canal be ſuch that it will diſcharge much more water than is ſupplied by TO. All this is very natural, and may be very common. The effect of this arrangement will be a remitting ſpring at P: for when the cavern is filled higher than the point N, the canal MNP will act as a ſyphon; and, by the conditions aſſumed, it will diſcharge the water faſter than TO ſupplies it; it will therefore run it dry, and then the ſpring at P will ceaſe to furniſh water. After ſome time the cavern will again be filled up to the height N, and the flow at P will recommence.

If, beſides this ſupply, the well P alſo receive water from a conſtant ſource, we ſhall have a reciprocating ſpring.

The ſituation and dimenſions of this ſyphon canal, and the ſupply of the feeder, may be ſuch, that the efflux at P will be conſtant. If the ſupply increaſe in a certain degree, a reciprocation will be produced at P with very ſhort intervals; if the ſupply diminiſhes conſiderably, we ſhall have another kind of reciprocation with great intervals and great differences of water.

If the cavern have another ſimple outlet R, new varieties will be produced in the ſpring P, and R will afford a copious ſpring. Let the mouth of R, by which the water enters into it from the cavern, be lower than N, and let the ſupply of the feeding ſpring be no greater than R can diſcharge, we ſhall have a conſtant ſpring from R, and P will give no water. But ſuppoſe that the main feeder increaſes in winter or in rainy ſeaſons, but not ſo much as will ſupply both P and R, the cavern will fill till the water gets over N, and R will be running all the while; but ſoon after P has begun to flow, and the water in the cavern ſinks below R, the ſtream from R will ſtop. The cavern will be emptied by the ſyphon canal MNP, and then P will ſtop. The cavern will then begin to fill, and when near full R will give a little water, and ſoon after P will run and R ſtop as before, &c.

Deſaguliers ſhows, vol. ii. p. 177, &c. in what manner a prodigious variety of periodical ebbs and flows may be produced by underground canals, which are extremely ſimple and probable.

374
Account of ſome pneumatic engines.

WE ſhall conclude this article with the deſcriptions of ſome pneumatical machines or engines which have not been particularly noticed under their names in the former volumes of this work.

Bellows are of moſt extenſive and important uſe; and it will be of ſervice to deſcribe ſuch as are of uncommon conſtruction and great power, fit for the great operations in metallurgy.

It is not the impulſive force of the blaſt that is wanted in moſt caſes, but merely the copious ſupply of air, to produce the rapid combuſtion of inflammable matter; and the ſervice would be better performed in general if this could be done with moderate velocities, and an extended ſurface. What are called air-furnaces, where a conſiderable ſurface of inflammable matter is acted on at once by the current which the mere heat of the expended air has produced, are found more operative in proportion to the air expended than blaſt furnaces animated by bellows; and we doubt not but that the method propoſed by Mr Cotterel (which we have already mentioned) of increaſing this current in a melting furnace by means of a dome, will in time ſuperſede the blaſt furnaces. There is indeed a great impulſive force required in ſome caſes; as for blowing off the ſcoriæ from the ſurface of ſilver or copper in refining furnaces, or for keeping a clear paſſage for the air in the great iron furnace.

In general, however, we cannot procure this abundant ſupply of air any other way than by giving it a great velocity by means of a great preſſure, ſo that the general conſtruction of bellows is pretty much the ſame in all kinds. The air is admitted into a very large cavity, and then expelled from it through a ſmall hole.

Plate CCCXXXII. Fig. 92. Fig. 93. Fig. 94.

The furnaces at the mines having been greatly enlarged; it was neceſſary to enlarge the bellows alſo: and the leathern bellows becoming exceedingly expenſive, wooden ones were ſubſtituted in Germany about the beginning of the 17th century, and from them became general through Europe. They conſiſt of a wooden box ABCPFE (fig. 92.), which has its top and two ſides flat or ſtraight, and the end BAE*e* formed into an arched or cylindrical ſurface, of which the line FP at the other end is the axis. This box is open below, and receives within it the ſhallow box KHGNML (fig. 93.), which exactly fills it. The line FP of the one coincides with FP of the other, and along this line is a ſet of hinges on which the upper box turns as it riſes and ſinks. The lower box is made faſt to a frame fixed in the ground. A pipe OQ proceeds from the end of it, and terminates at the furnace, where it ends in a ſmall pipe called the *tewer* or *tuyere*. This lower box is open above, and has in its bottom two large valves V, V, fig. 94. opening inwards. The conducting pipe is ſometimes furniſhed with a valve opening outwards, to prevent burning coals from being ſucked into the bellows when the upper box is drawn up. The joint along PF is made tight by thin leather nailed along it. The ſides and ends of the fixed box are made to fit the ſides and curved end of the upper box, ſo that this laſt can be raiſed and lowered round the joint FP without ſenſible friction, and yet without ſuffering much air to eſcape: but as this would not be ſufficiently air-tight by reaſon of the ſhrinking and warping of the wood, a farther contrivance is adopted. A ſlender lath of wood, divided into ſeveral joints, and covered on the outer edge with very ſoft leather, is laid along the upper edges of the ſides and ends of the lower box. This lath is ſo broad, that when its inner edge is even with the inſide of the box, its outer edge projects about an inch. It is kept in this poſition by a number of ſteel wires, which are driven into the bottom of the box, and ſtand up touching the ſides, as repreſented in fig 95. where *a b c* are the wires, and *e* the lath, projecting over the outſide of the box. By this contrivance the laths are preſſed cloſe to the ſides and curved end of the moveable box, and the ſpring wires yield to all their inequalities. A bar of wood RS (fig. 92.) is fixed to the upper board, by which it is either raiſed by machinery, to ſink again by its own weight, having an additional load laid on it, or it is forced downward by a crank or wiper of the machinery, and afterwards raiſed.

Fig. 95. Fig. 92.

The operation here is preciſely ſimilar to that of blowing with a chamber-bellows. When the board is lifted up, the air enters by the valves V, V, fig. 94. and is expelled at the pipe OQ by depreſſing the boards. There is therefore no occaſion to inſiſt on this point.

Theſe bellows are made of a very great ſize, AD being 16 feet, AB five feet, and the circular end AE alſo five feet. The riſe, however, is but about 3 or 3½ feet. They expel at each ſtroke about 90 cubic feet of air, and they make about 8 ſtrokes per minute.

Such are the bellows in general uſe on the continent. We have adopted a different form in this kingdom, which ſeems much preferable. We uſe an iron or wooden cylinder, with a piſton ſliding along it. This may be made with much greater accuracy than the wooden boxes, at leſs expence, if of wood, becauſe it may be of coopers work, held together by hoops; but the great advantage of this form is its being more eaſily made air-tight. The piſton is ſurrounded with a broad ſtrap of thick and ſoft leather, and it has around its edge a deep groove, in which is lodged a quantity of wool. This is called the packing or ſtuffing, and keeps the leather very cloſely applied to the inner ſurface of the cylinder. Iron cylinders may be very neatly bored and ſmoothed, ſo that the piſton, even when very tight, will ſlide along it very ſmoothly. To promote this, a quantity of black lead is ground very fine with water, and a little of this is ſmeared on the inſide of the cylinder from time to time.

The cylinder has a large valve, or ſometimes two, in the bottom, by which the atmoſpheric air enters when the piſton is drawn up. When the piſton is thruſt down, this air is expelled along a pipe of great diameter, which terminates in the furnace with a ſmall orifice.

Fig. 96.

This is the ſimpleſt form of bellows which can be conceived. It differs in nothing but ſize from the bellows uſed by the rudeſt nations. The Chineſe ſmiths have a bellows very ſimilar, being a ſquare pipe of wood ABCDE (fig. 96.), with a ſquare board G which exactly fits it, moved by the handle FG. At the farther end is the blaſt pipe HK, and on each ſide of it a valve in the end of the ſquare pipe, opening inwards. The piſton is ſufficiently tight for their purpoſes without any leathering.

The piſton of this cylinder bellows is moved by machinery. In ſome blaſt engines the piſton is ſimply raiſed by the machine, and then let go, and it deſcends by its own weight, and compreſſes the air below it to ſuch a degree, that the velocity of efflux becomes conſtant, and the piſton deſcends uniformly: for this purpoſe it muſt be loaded with a proper weight. This produces a very uniform blaſt, except at the very beginning, while the piſton falls ſuddenly and compreſſes the air. but in moſt engines the piſton rod is forced down

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the cylinder with a determined motion, by means of a beam, crank, or other contrivance. This gives a more regular blaſt, becauſe the motion of the piſton is neceſſarily ſlow in the beginning and end of the ſtroke, and quicker in the middle.

But in all it is plain that the blaſt muſt be deſultory. It ceaſes while the piſton is riſing; for this reaſon it is uſual to have two cylinders, as it was formerly uſual to have two bellows which worked alternately. Sometimes three or four are uſed, as at the Carron iron works. This makes a blaſt abundantly uniform.

But an uniform blaſt may be made with a ſingle cylinder, by making it deliver its air into another cylinder, which has a piſton exactly fitted to its bore, and loaded with a ſufficient weight. The blowing cylinder ABCD (fig. 97.) has its piſton P worked by a rod NP, connected by double chains with the arched head of the working beam NO, moving round a gudgeon at R. The other end O of this beam is connected by the rod OP, with the crank PQ of a wheel machine; or it may be connected with the piſton of a ſteam engine, &c. &c. The blowing cylinder has a valve or valves E in its bottom, opening inwards. There proceeds from it a large pipe CF, which enters the regulating cylinder GHKI, and has a valve at top to prevent the air from getting back into the blowing cylinder. It is evident that the air forced into this cylinder muſt raiſe its piſton L, and that it muſt afterwards deſcend, while the other piſton is riſing. It muſt deſcend uniformly, and make a perfectly equable blaſt.

Fig. 97.

Obſerve, that if the piſton L be at the bottom when the machine begins to work, it will be at the bottom at the end of every ſtroke, if the *tuyere* T emits as much air as the cylinder ABCD furniſhes; nay, it will lie a while at the bottom, for, while it was riſing, air was iſſuing through T. This would make an interrupted blaſt. To prevent this, the orifice T muſt be leſſened; but then there will be a ſurplus of air at the end of each ſtroke, and the piſton L will riſe continually, and at laſt get to the top, and allow air to eſcape. It is juſt poſſible to adjuſt circumſtances, ſo that neither ſhall happen. This is done eaſier by putting a ſtop in the way of the piſton, and putting a valve on the piſton, or on the conducting pipe KST, loaded with a weight a little ſuperior to the intended elaſticity of the air in the cylinder. Therefore, when the piſton is prevented by the ſtop from riſing, the ſniſting valve, as it is called, is forced open, the ſuperfluous air eſcapes, and the blaſt preſerves its uniformity.

It may be of uſe to give the dimenſions of a machine of this kind, which has worked for ſome years at a very great furnace, and given ſatisfaction.

The diameter of the blowing cylinder is 5 feet, and the length of the ſtroke is 6. Its piſton is loaded with 3¼ tons. It is worked by a ſteam engine whoſe cylinder is 3 feet 4 inches wide, with a ſix feet ſtroke. The regulating cylinder is 8 feet wide, and its piſton is loaded with 8¼ tons, making about 2.63 pounds on the ſquare inch; and it is very nearly in equilibrio with the load on the piſton of the blowing cylinder. The conducting pipe KST is 12 inches in diameter, and the orifice of the tuyere was ⅝ of an inch when the engine was erected, but it has gradually enlarged by reaſon of the intenſe heat to which it is expoſed. The ſniſting valve is loaded with 3 pounds on the ſquare inch.

When the engine worked briſkly, it made 18 ſtrokes per minute, and there was always much air diſcharged by the ſniſting valve. When the engine made 15 ſtrokes per minute, the ſniſting valve opened but ſeldom, ſo that things were nearly adjuſted to this ſupply. Each ſtroke of the blowing cylinder ſent in 118 cubic feet of common air. The ordinary preſſure of the air being ſuppoſed 14¾ pounds on an inch, the denſity of the air in the regulating cylinder muſt be $\frac{14.75+2.63}{14.75}, =1.1783$, the natural denſity being 1.

This machine gives an opportunity of comparing the expence of air with the theory. It muſt (at the rate of 15 ſtrokes) expel 30 cubic feet of air in a ſecond through a hole of 1⅝ inches in diameter. This gives a velocity of near 2000 feet per ſecond, and of more than 1600 feet for the condenſed air. This is vaſtly greater than the theory can give, or is indeed poſſible; for air does not ruſh into a void with ſo great velocity. It ſhows with great evidence, that a vaſt quantity of air muſt eſcape round the two piſtons. Their united circumferences amount to above 40 feet, and they move in a dry cylinder. It is impoſſible to prevent a very great loſs. Accordingly, a candle held near the edge of the piſton L has its flame very much diſturbed. This caſe, therefore, gives no hold for a calculation; and it ſuggeſts the propriety of attempting to diminiſh this great waſte.

This has been very ingeniouſly done (in part at leaſt) at ſome other furnaces. At Omoah foundery, near Glaſgow, the blowing cylinder (alſo worked by a ſteam engine) delivers its air into a cheſt without a bottom, which is immerſed in a large ciſtern of water, and ſupported at a ſmall height from the bottom of the ciſtern, and has a pipe from its top leading to the tuyere. The water ſtands about five feet above the lower brim of the regulating air-cheſt, and by its preſſure gives the moſt perfect uniformity of blaſt, without allowing a particle of air to get off by any other paſſage beſides the tuyere. This is a very effectual regulator, and muſt produce a great ſaving of power, becauſe a ſmaller blowing cylinder will thus ſupply the blaſt. We muſt obſerve, that the loſs round the piſton of the blowing cylinder remains undiminiſhed.

A blowing machine was erected many years ago at Chaſtillon in France on a principle conſiderably different, and which muſt be perfectly air-tight throughout. Two cylinders A, B (fig. 98.), loaded with great weights, were ſuſpended at the ends of the lever CD, moving round the gudgeon E. From the top F, G of each there was a large flexible pipe which united in H, from whence a pipe KT led to the tuyere T. There were valves at F and G opening outwards, or into the flexible pipes; and other valves L, M, adjoining to them in the top of each cylinder, opening inwards, but kept ſhut by a ſlight ſpring. Motion was given to the lever by a machine. The operation of this blowing machine is evident. When the cylinder A was pulled down, or allowed to deſcend, the water, entering at its bottom, compreſſed the air, and forced it along the paſſage FHKT. In the mean time, the cylinder B was riſing, and the air entered by the valve M. We ſee that the blaſt will be very unequal, increaſing as the cylinder is immerſed deeper. It is needleſs to deſcribe this machine more particularly, becauſe we ſhall give

Plate CCCCXXXIII. Fig 98.

give an account of one which we think perfect in its kind, and which leaves hardly any thing to be deſired in a machine of this ſort. It was invented by Mr John Laurie, land-ſurveyor in Edinburgh, about 15 years ago, and improved in ſome reſpects ſince his death by an ingenious perſon of that city.

Fig. 99. ABCD (fig. 99.) is an iron cylinder, truly bored within, and evaſated a-top like a cup. EFGH is another, truly turned both without and within, and a ſmall matter leſs than the inner diameter of the firſt cylinder. This cylinder is cloſe above, and hangs from the end of a lever moved by a machine. It is alſo loaded with weights at N. KILM is a third cylinder, whoſe outſide diameter is ſomewhat leſs than the inſide diameter of the ſecond. This inner cylinder is fixed to the ſame bottom with the outer cylinder. The middle cylinder is looſe, and can move up and down between the outer and inner cylinders without rubbing on either of them. The inner cylinder is perforated from top to bottom by three pipes OQ, SV, PR. The pipes OQ, PR have valves at their upper ends O, P, and communicate with the external air below. The pipe SV has a horizontal part VW, which again turns upwards, and has a valve at top X. This upright part WX is in the middle of a ciſtern of water *f h k g*. Into this ciſtern is fixed an air-cheſt *a* YZ *b*, open below, and having at top a pipe *c d e* terminating in the tuyere at the furnace.

When the machine is at reſt, the valves X, O, P, are ſhut by their own weights, and the air-cheſt is full of water. When things are in this ſtate, the middle cylinder EFGH is drawn up by the machinery till its lower brims F and G are equal with the top RM of the inner cylinder. Now pour in water or oil between the outer and middle cylinders: it will run down and fill the ſpace between the outer and inner cylinders. Let it come to the top of the inner cylinder.

Now let the loaded middle cylinder deſcend. It cannot do this without compreſſing the air which is between its top and the top of the inner cylinder. This air being compreſſed will cauſe the water to deſcend between the inner and middle cylinders, and riſe between the middle and outer cylinders, ſpreading into the cup; and as the middle cylinder advances downwards, the water will deſcend farther within it and riſe farther without it. When it has got ſo far down, and the air has been ſo much compreſſed, that the difference between the ſurface of the water on the inſide and outſide of this cylinder is greater than the depth of water between X and the ſurface of the water *fg*, air will go out by the pipe SVW, and will lodge in the air-cheſt, and will remain there if *c* be ſhut, which we ſhall ſuppoſe for the preſent. Puſhing down the middle cylinder till the partition touch the top of the inner cylinder, all the air which was formerly between them will be forced into the air-cheſt, and will drive out water from it. Draw up the middle cylinder, and the external air will open the valves O, P, and again fill the ſpace between the middle and inner cylinders; for the valve X will ſhut, and prevent the regreſs of the condenſed air. By puſhing down the middle cylinder a ſecond time, more air will be forced into the air-cheſt, and it will at laſt eſcape by getting out between its brims Y, Z and the bottom of the ciſtern; or if we open the paſſage *c*, it will paſs along the conduit *c d e* to the tuyere, and form a blaſt.

The operation of this machine is ſimilar to Mr Haſkins's quickſilver pump deſcribed by Deſaguliers at the end of the ſecond volume of his Experimental Philoſophy. The force which condenſes the air is the load on the middle cylinder. The uſe of the water between the inner and outer cylinders is to prevent this air from eſcaping; and the inner cylinder thus performs the office of a piſton, having no friction. It is neceſſary that the length of the outer and middle cylinders be greater than the depth of the regulator-ciſtern, that there may be a ſufficient height for the water to riſe between the middle and outer cylinders, to balance the compreſſed air, and oblige it to go into the air-cheſt. A large blaſt-furnace will require the regulator-ciſtern five feet deep, and the cylinders about ſix or ſeven feet long.

It is in fact a pump without friction, and is perfectly air-tight. The quickneſs of its operation depends on the ſmall ſpace between the middle cylinder and the two others; and this is the only uſe of theſe two. Without theſe it would be ſimilar to the engine at Chaſtillon, and operate more unequally and ſlowly. Its only imperfection is, that if the cylinder begin its motion of aſcent or deſcent rapidly, as it will do when worked by a ſteam-engine, there will be ſome danger of water daſhing over the top of the inner cylinder and getting into the pipe SV; but ſhould this happen, an iſſue can eaſily be contrived for it at V, covered with a loaded valve *v*. This will never happen if the cylinder is moved by a crank.

One blowing cylinder only is repreſented here, but two may be uſed.

We do not heſitate in recommending this form of bellows as the moſt perfect of any, and fit for all uſes where ſtanding bellows are required. They will be cheaper than any other ſort for common purpoſes. For a common ſmith's forge they may be made with ſquare wooden boxes inſtead of cylinders. They are alſo eaſily repaired. They are perfectly tight; and they may be made with a blaſt almoſt perfectly uniform, by making the ciſtern in which the air-cheſt ſtands of conſiderable dimenſions. When this is the caſe, the height of water, which regulates the blaſt, will vary very little.

This may ſuffice for an account of blaſt machines. The leading parts of their conſtruction have been deſcribed as far only as was neceſſary for underſtanding their operation, and enabling an engineer to erect them in the moſt commodious manner. Views of complete machines might have amuſed, but they would not have added to our reader's information.

But the account is imperfect unleſs we ſhow how their parts may be ſo proportioned that they ſhall perform what is expected from them. The engineer ſhould know what ſize of bellows, and what load on the board or piſton, and what ſize of tuyere, will give the blaſt which the ſervice requires, and what force muſt be employed to give them the neceſſary degree of motion. We ſhall accompliſh theſe purpoſes by conſidering the efflux of the compreſſed air through the tuyere. The propoſitions formerly delivered will enable us to aſcertain this.

That we may proportion every thing to the power employed, we muſt recollect, that if the piſton of a cylinder employed for expelling air be preſſed down with any force p, it muſt be conſidered as ſuperadded to the atmoſpheric preſſure P on the ſame piſton, in order that we may compare the velocity v of efflux with the known velocity V with which air ruſhes into a void. By what has been formerly delivered, it appears that this velocity $v = V \times \sqrt{\frac{p}{P \times p}}$, where P is the preſſure of the atmoſphere on the piſton, and p the additional load laid on it. This velocity is expreſſed in feet per ſecond; and, when multiplied by the area of the orifice (alſo expreſſed in ſquare feet), it will give us the cubical feet of condenſed air expelled in a ſecond: but the bellows are always to be filled again with common air, and therefore we want to know the quantity of common air which will be expelled; for it is this which determines the number of ſtrokes which muſt be made in a minute, in order that the proper ſupply may be obtained. Therefore recollect that the quantity expelled from a given orifice with a given velocity, is in the proportion of the denſity; and that when D is the denſity of common air produced by the preſſure P, the denſity d produced by the preſſure $P+p$, is $D \times \frac{P+p}{P}$; or if D be made 1, we have $d = \frac{P+p}{P}$.

Therefore, calling the area of the orifice expreſſed in ſquare feet O, and the quantity of common air, or the cubic feet expelled in a ſecond Q, we have $Q = V \times O \times \sqrt{\frac{p}{P+p}} \times \frac{P+p}{P}$.

It will be ſufficiently exact for all practical purpoſes to ſuppoſe P to be 15 pounds on every ſquare inch of the piſton; and p is then conveniently expreſſed by the pounds of additional load on every ſquare inch: we may alſo take $V = 1332$ feet.

As the orifice through which the air is expelled is generally very ſmall, never exceeding three inches in diameter, it will be more convenient to expreſs it in ſquare inches; which being the $\frac{1}{144}$ of a ſquare foot, we ſhall have the cubic feet of common air expelled in a ſecond, or $Q = \frac{1332}{144} O \sqrt{\frac{p}{P+p}} \times \frac{P+p}{P}, = O \times 9.25 \times \sqrt{\frac{p}{P+p}} \times \frac{P+p}{P}$; and this ſeems to be as ſimple an expreſſion as we can obtain.

This will perhaps be illuſtrated by taking an example in numbers. Let the area of the piſton be four ſquare feet, and the area of the round hole through which the air is expelled be two inches, its diameter being 1.6, and let the load on the piſton be 1728 pounds: this is three pounds on every ſquare inch. We have $P = 15$, $p = 3$, $P+p = 18$, and $O = 2$; therefore we will have $Q = 2 \times 9.25 \times \sqrt{\frac{3}{18}} \times \frac{18}{15}, = 9.053$ cubic feet of common air expelled in a ſecond. This will however be diminiſhed at leaſt one-third by the contraction of the jet; and therefore the ſupply will not exceed ſix cubic feet per ſecond. Suppoſing therefore that this blowing machine is a cylinder or priſm of this dimenſion in its ſection, the piſton ſo loaded would (after having compreſſed the air) deſcend about 15 inches in a ſecond: It would firſt ſink one-fifth of the whole length of the cylinder pretty ſuddenly, till it had reduced the air to the denſity $\frac{18}{15}$, and would then deſcend uniformly at the above rate, expelling ſix cubic feet of common air in a ſecond.

The computation is made much in the ſame way for bellows of the common form, with this additional circumſtance, that as the loaded board moves round a hinge at one end, the preſſure of the load muſt be calculated accordingly. The computation, however, becomes a little intricate, when the form of the loaded board is not rectangular: it is almoſt uſeleſs when the bellows have flexible ſides, either like ſmiths bellows or like organ bellows, becauſe the change of figure during their motion makes continual variation on the compreſſing powers. It is therefore chiefly with reſpect to the great wooden bellows, of which the upper board ſlides down between the ſides, that the above calculation is of ſervice.

The propriety, however, of this piece of information is evident: we do not know preciſely the quantity of air neceſſary for animating a furnace; but this calculation tells us what force muſt be employed for expelling the air that may be thought neceſſary. If we have fixed on the ſtrength of the blaſt, and the diameter of the cylinder, we learn the weight with which the piſton muſt be loaded; the length of the cylinder determines its capacity, the above calculation tells the expence per ſecond; hence we have the time of the piſton's coming to the bottom. This gives us the number of ſtrokes per minute: the load muſt be lifted up by the machine this number of times, making the time of aſcent preciſely equal to that of deſcent; otherwiſe the machine will either catch and ſtop the deſcent of the piſton, or allow it to lie inactive for a while of each ſtroke. Theſe circumſtances determine the labour to be performed by the machine, and it muſt be conſtructed accordingly. Thus the engineer will not be affronted by its failure, nor will he expend needleſs power and coſt.

In machines which force the piſton or bellows-board with a certain determined motion, different from what ariſes from their own weight, the computation is extremely intricate. When a piſton moves by a crank, its motion at the beginning and end of each ſtroke is ſlow, and the compreſſion and efflux is continually changing: we can however approximate to a ſtatement of the force required.

Every time the piſton is drawn up, a certain ſpace of the cylinder is filled again with air of the common denſity; and this is expelled during the deſcent of the piſton. A certain number of cubic feet of common air is therefore expelled with a velocity which perhaps continually varies; but there is a medium velocity with which it might have been uniformly expelled, and a preſſure correſponding to this velocity. To find this, divide the area of the piſton by the area of the blaſt-hole (or rather by this area multiplied by 0.613, in order to take in the effect of the contracted jet), and multiply the length of the ſtroke performed in a ſecond by the quotient ariſing from this diviſion; the product is the medium velocity of the air (of the natural denſity). Then find by calculation the height through which a heavy body muſt fall in order to acquire this velocity; this is the height of a column of homogeneous air which would expel it with this velocity. The weight of this column is the least force that can be exerted by the engine: but this force is too ſmall to overcome the reſiſtance in the middle of the ſtroke, and it is too great even for the end of the ſtroke, and much too great for the beginning of it. But if the machine is turned by a very heavy water-wheel, this will act as a regulator, accumulating in itſelf the ſuperfluous force during the too favourable poſitions of the crank, and exerting it by its *vis inertiæ* during the time of greateſt effort. A force not greatly exceeding the weight of this column of air will therefore ſuffice. On the other hand, if the ſtrength of the blaſt be determined, which is the general ſtate of the problem, this determines the degree of condenſation of the air, and the load on the ſquare inch of the piſton, or the mean force which the machine muſt exert on it. A table, which will be given preſently, determines the cubic feet of common air expelled in a ſecond, correſponding to this load. This combined with the propoſed dimenſions of the cylinder, will give the deſcent of the piſton, or the length of the ſtroke.

Theſe general obſervations apply to all forms of bellows; and without a knowledge of them no perſon can erect a machine for working them without total uncertainty or ſervile imitation. In order, therefore, that they may be uſeful to ſuch as are not accuſtomed to the management of even theſe ſimple formulæ, we inſert the following ſhort table of the velocity and quantity of air diſcharged from a cylinder whoſe piſton is loaded with the pounds contained in the firſt column on every ſquare inch. The ſecond column contains the velocity with which the *condenſed air* ruſhes out through any *ſmall* hole; and the third column is the cubic feet diſcharged from a hole whoſe area is a ſquare inch; column fourth contains the mean velocity of air of the common denſity; and column fifth is the cubic feet of common air diſcharged; the ſixth column is the height in inches at which the force of the blaſt would ſupport a column of water if a pipe were inſerted into the ſide of the cylinder. This is an extremely proper addition to ſuch machines, ſhowing at all times the power of the machines, and teaching us what intenſity of blaſt is employed for different purpoſes. The table is computed from the ſuppoſition that the ordinary preſſure of the air is 15 pounds on a ſquare inch. This is ſomewhat too great, and therefore the velocities are a little too ſmall; but the quantities diſcharged will be found about one-third too great (without affecting the velocities) on account of the convergency of the ſtream.

I	II	III	IV	V	VI
½	239	1.66	247	1.72	14
1	333	2.32	355	2.47	27
1½	404	2.79	437	3.05	40
2	457	3.17	518	3.60	54
2½	500	3.48	584	4.2	68
3	544	3.76	653	4.53	82
3½	582	4.03	715	4.98	95
4	611	4.24	774	5.38	109
4½	642	4.46	822	5.75	122
5	666	4.67	868	6.17	136
5½	693	4.84	950	6.49	150
6	711	5.06	997	6.92	163

This table extends far beyond the limits of ordinary uſe, very few blaſt-furnaces having a force exceeding 60 inches of water.

We ſhall conclude this account of blowing machines with a deſcription of a ſmall one for a blowpipe. ABCD, fig. 100. is a veſſel containing water, about two feet deep. EFGH is the air-box of the blower open below, and having a pipe ILK riſing up from it to a convenient height; an arm ON which is fixed to this pipe carries the lamp N; the blowpipe LM comes from the top of the upright pipe. PKQ is the feeding pipe reaching near to the bottom of the veſſel.

Fig. 100.

Water being poured into the veſſel below, and its cover being put on, which fits the upright pipe, and touches two ſtuds *a*, *a*, projecting from it, blow in a quantity of air by the feeding pipe PQ; this expels the water from the air box, and occaſions a preſſure which produces the blaſt through the blowpipe M.

In N° 54. of this article, we mentioned an application which has been made of Hero's fountain, at Chemnitz in Hungary, for raiſing water from the bottom of a mine. We ſhall now give an account of this very ingenious contrivance.

In fig. 101. B repreſents the ſource of water elevated above the mouth of the pit 136 feet. From this there is led a pipe B*b*CD four inches diameter. This pipe enters the top of a copper cylinder *b c d e*, 8½ feet high, five feet diameter, and two inches thick, and it reaches to within four inches of the bottom; it has a cock at C. This cylinder has a cock at F, and a very large one at E. From the top *b c* proceeds a pipe GHH′ two inches in diameter, which goes down the pit 96 feet, and is inſerted into the top of another braſs cylinder *f g h i*, which is 6½ feet high, four feet diameter, and two inches thick, containing 83 cubic feet, which is very nearly one half of the capacity of the other, viz. of 170 cubic feet. There is another pipe NI of four inches diameter, which riſes from within four inches of the bottom of this lower cylinder, is ſoldered into its top, and riſes to the trough NO, which carries off the water from the mouth of the pit. This lower cylinder communicates at the bottom with the water L which collects in the drains of the mine. A large cock K ſerves to admit or exclude this water; another cock M, at the top of this cylinder, communicates with the external air.

Fig. 101.

Now ſuppoſe the cock C ſhut, and all the reſt open; the upper cylinder will contain air, and the lower cylinder will be filled with water, becauſe it is ſunk ſo deep that its top is below the uſual ſurface of the mine-waters. Now ſhut the cocks F, E, M, K, and open the cock C. The water of the ſource B muſt run in by the orifice D, and riſe in the upper cylinder, compreſſing the air above it and along the pipe GHH′, and thus acting on the ſurface of the water in the lower cylinder. It will therefore cauſe it to riſe gradually in the pipe IN, where it will always be of ſuch a height that its weight balances the elaſticity of the compreſſed air. Suppoſe no iſſue given to the air from the upper cylinder, it would be compreſſed into one-fifth of its bulk by the column of 136 feet high; for a column of 34 feet nearly balances the ordinary elaſticity of the air. Therefore, when there is an iſſue given to it through the pipe GHH′, it will drive the compreſſed air along this pipe, and it will expel water from the lower cylinder. When the upper cylinder is full of water, there will be 34 cubic feet of water expelled from the lower cylinder. If the pipe IN had been more than 136 feet long, the water would have riſen 136 feet, being then in equilibrio with the water in the feeding pipe B*b*CD (as was ſhown in N° 52.), by the intervention of the elaſtic air; but no more water would have been expelled from the lower cylinder than what fills this pipe. But the pipe being only 96 feet high, the water will be thrown out at N with a very great velocity. If it were not for the great obſtructions which water and air muſt meet with in their paſſage along pipes, it would iſſue at N with a velocity of more than 50 feet per ſecond. It iſſues much more ſlowly, and at laſt the upper cylinder is full of water, and the water would enter the pipe GH and enter the lower cylinder, and without diſplacing the air in it, would riſe through the diſcharging pipe IN, and run off to waſte. To prevent this there hangs in the pipe HG a cork ball or double cone, by a braſs wire which is guided by holes in two croſs pieces in the pipe HG. When the upper cylinder is filled with water, this cork plugs up the orifice G, and no water is waſted; the influx at D now ſtops. But the lower cylinder contains compreſſed air, which would balance water in a diſcharging pipe 136 feet high, whereas IN is only 96. Therefore the water will continue to flow at N till the air has ſo far expanded as to balance only 96 feet of water, that is, till it occupies one-fourth of its ordinary bulk, that is, one-fourth of the capacity of the upper cylinder, or $42\frac{1}{2}$ cubic feet. Therefore $42\frac{1}{2}$ cubic feet will be expelled, and the efflux at N will ceaſe; and the lower cylinder is about one half full of water. When the attending workman obſerves this, he ſhuts the cock C. He might have done this before, had he known when the orifice G was ſtopped; but no loſs enſues from the delay. At the ſame time the attendant opens the cock E, the water iſſues with great violence, being preſſed by the condenſed air from the lower cylinder. It therefore iſſues with the ſum of its own weight and of this compreſſion. Theſe gradually decreaſe together, by the efflux of the water and the expanſion of the air; but this efflux ſtops before all the water has flowed out; for there is $42\frac{1}{2}$ feet of the lower cylinder occupied by air. This quantity of water remains, therefore, in the upper cylinder nearly: the workman knows this, becauſe the diſcharged water is received firſt of all into a veſſel containing three-fourths of the capacity of the upper cylinder. Whenever this is filled, the attendant opens the cock K by a long rod which goes down the ſhaft; this allows the water of the mine to fill the lower cylinder, allows the air to get into the upper cylinder, and this allows the remaining water to run out of it.

And thus every thing is brought into its firſt condition; and when the attendant ſees no more water come out at E, he ſhuts the cocks E and M, and opens the cock C, and the operation is repeated.

There is a very ſurpriſing appearance in the working of this engine. When the efflux at N has ſtopped, if the cock F be opened, the water and air ruſh out together with prodigious violence, and the drops of water are changed into hail or lumps of ice. It is a ſight uſually ſhown to ſtrangers, who are deſired to hold their hats to receive the blaſt of air: the ice comes out with ſuch violence as frequently to pierce the hat like a piſtol bullet. This rapid congelation is a remarkable inſtance of the general fact, that air by ſuddenly expanding, generates cold, its capacity for heat being increaſed. Thus the peaſant cools his broth by blowing over the ſpoon, even from warm lungs: a ſtream of air from a pipe is always cooling.

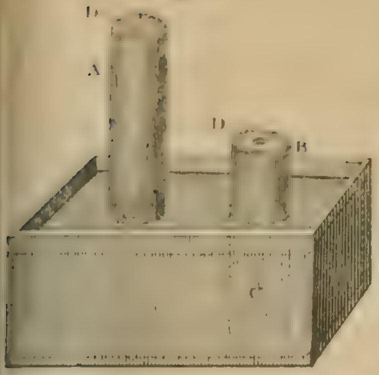
The above account of the procedure in working this engine ſhows that the efflux both at N and E becomes very ſlow near the end. It is found convenient therefore not to wait for the complete diſcharges, but to turn the cocks when about 30 cubic feet of water have been diſcharged at N: more work is done in this way. A gentleman of great accuracy and knowledge of theſe ſubjects took the trouble, at our deſire, of noticing particularly the performance of the machine. He obſerved that each ſtroke, as it may be called, took up about three minutes and one-eighth; and that 32 cubic feet of water were diſcharged at N, and 66 were expended at E. The expence therefore is 66 feet of water falling 136 feet, and the performance is 32 raiſed 96, and they are in the proportion of 66×136 to 32×96, or of 1 to 0.3422, or nearly as 3 to 1. This is ſuperior to the performance of the moſt perfect underſhot mill, even when all friction and irregular obſtructions are neglected; and is not much inferior to any overſhot pump-mill that has yet been erected. When we reflect on the great obſtructions which water meets with in its paſſage through long pipes, we may be aſſured that, by doubling the ſize of the feeder and diſcharger, the performance of the machine will be greatly improved; we do not heſitate to ſay, that it would be increaſed one-third: it is true that it will expend more water; but this will not be nearly in the ſame proportion; for moſt of the deficiency of the machine ariſes from the needleſs velocity of the firſt efflux at N. The diſcharging pipe ought to be 110 feet high, and not give ſenſibly leſs water.

Then it muſt be conſidered how inferior in original expence this ſimple machine muſt be to a mill of any kind which would raiſe 10 cubic feet 96 feet high in a minute, and how ſmall the repairs on it need be, when compared with a mill.

And, laſtly, let it be noticed, that ſuch a machine can be uſed where no mill whatever can be put in motion. A ſmall ſtream of water, which would not move any kind of wheel, will here raiſe one-third of its own quantity to the ſame height; working as faſt as it is ſupplied.

For all theſe reaſons, we think that the Hungarian machine eminently deſerves the attention of mathematicians and engineers, to bring it to its utmoſt perfection, and into general uſe. There are ſituations where this kind of machine may be very uſeful. Thus, where the tide riſes 17 feet, it may be uſed for compreſſing air to ſeven-eighths of its bulk; and a pipe leading from a very large veſſel inverted in it, may be uſed for raiſing the water from a veſſel of one-eighth of its capacity 17 feet high; or if this veſſel has only $\frac{1}{16}$ of the capacity of the large one ſet in the tide-way, two pipes may be led from it, one into the ſmall veſſel and the other into an equal veſſel 16 feet higher, which receives the water from the firſt. Thus one-ſixteenth of the water may be raiſed 34 feet, and a ſmaller quantity to a ſtill greater height; and this with a kind of power that can hardly be applied in any other way. Machines of this kind are deſcribed by Schottus, Sturmius, Leupold, and other old writers; and they ſhould not be forgotten, becauſe opportunities may

Fig. 1.



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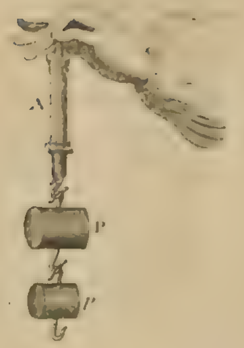

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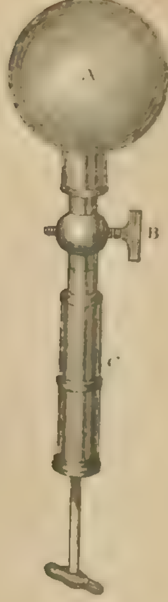

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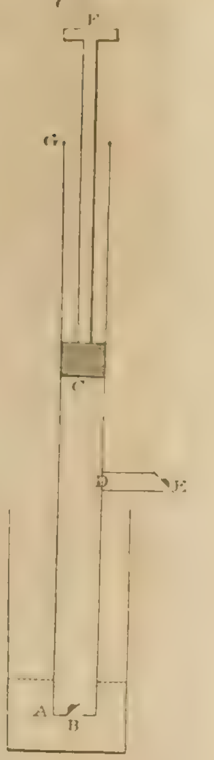

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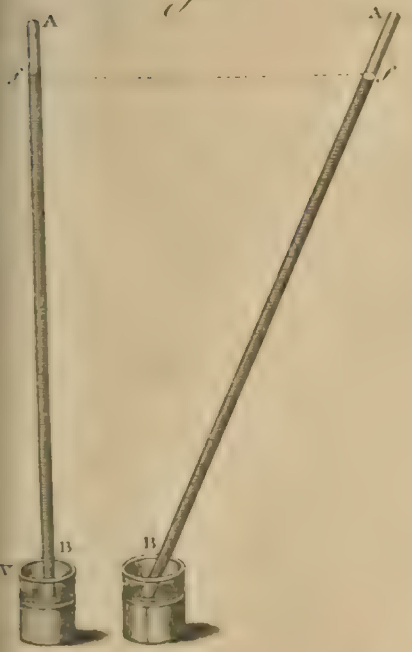

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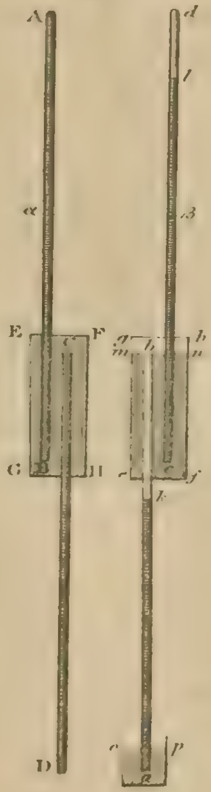

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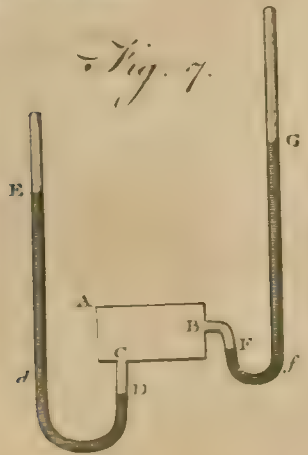

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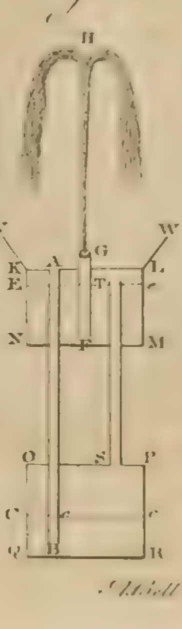

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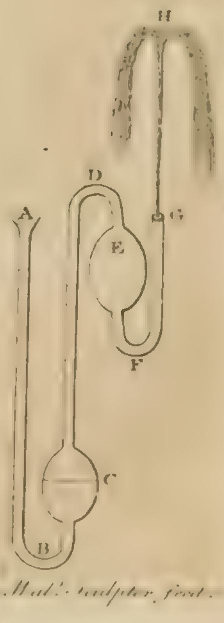

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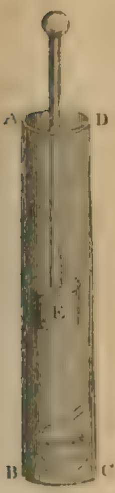
PNEUMATICS.

Fig 11.



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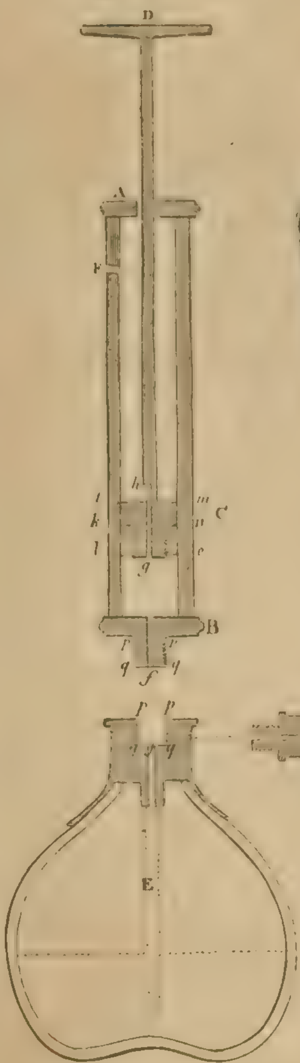

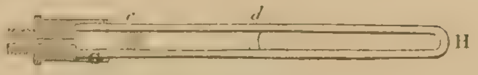

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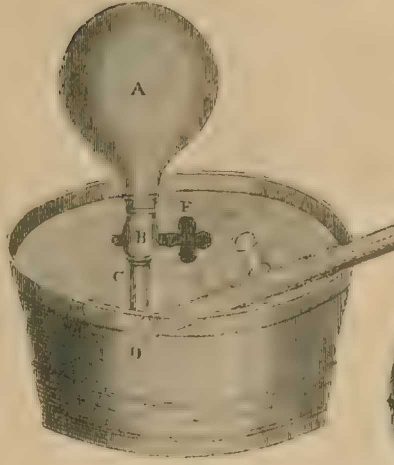

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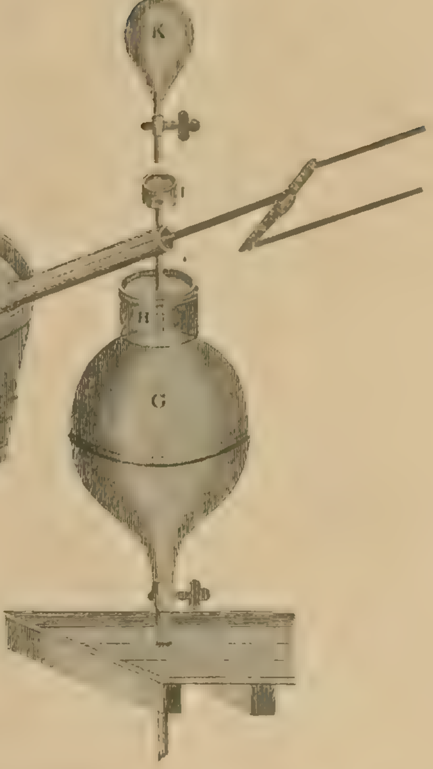

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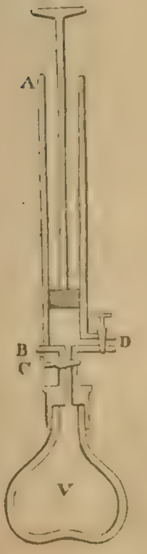

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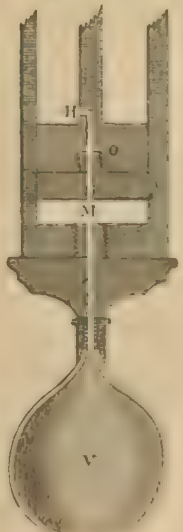

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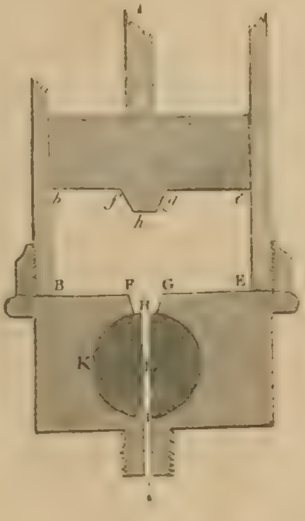

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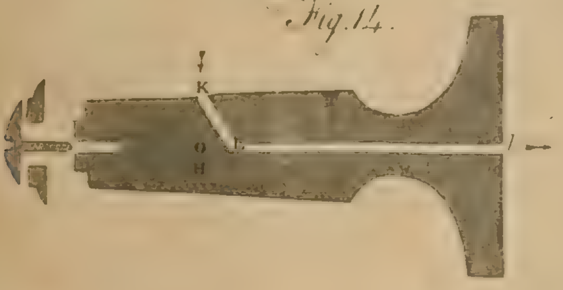

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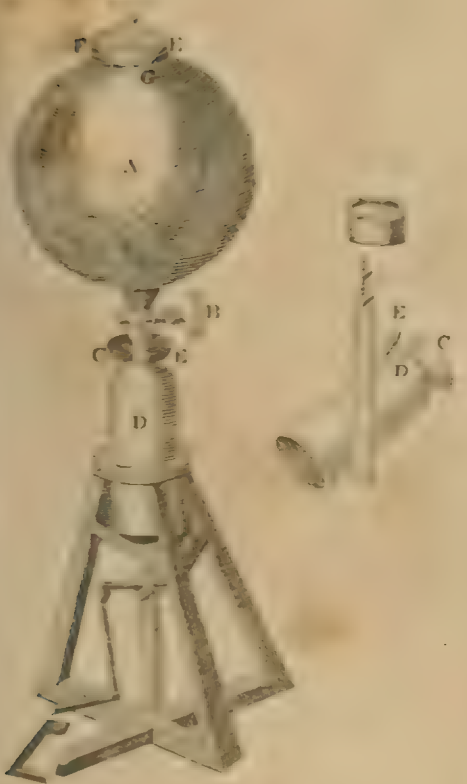

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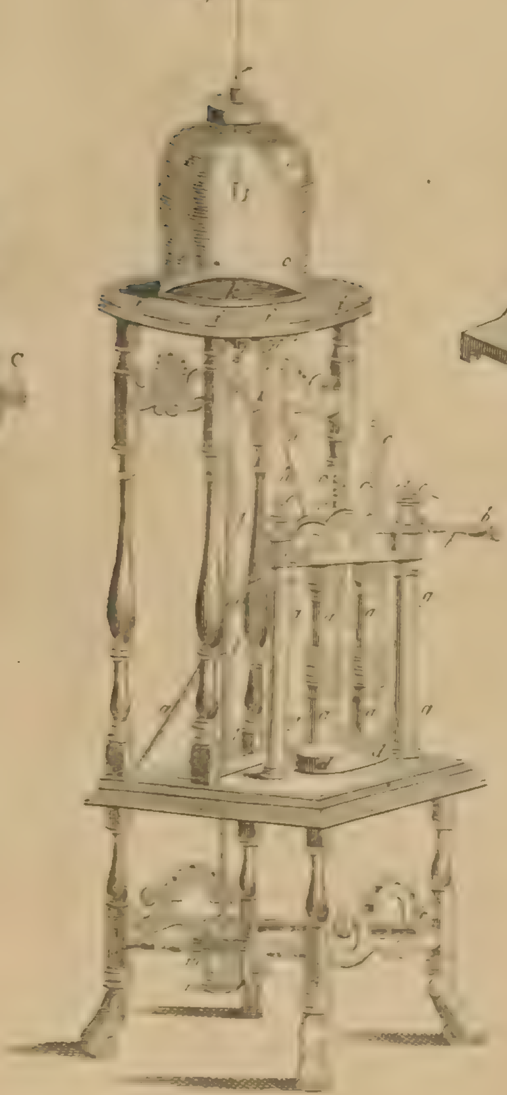

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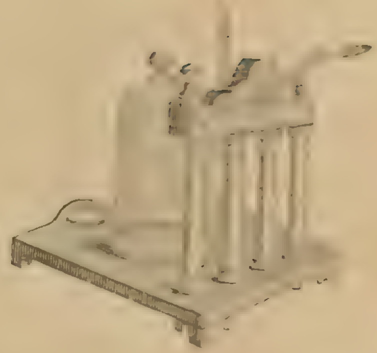

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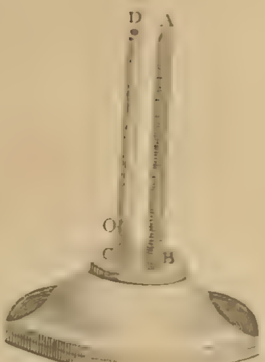

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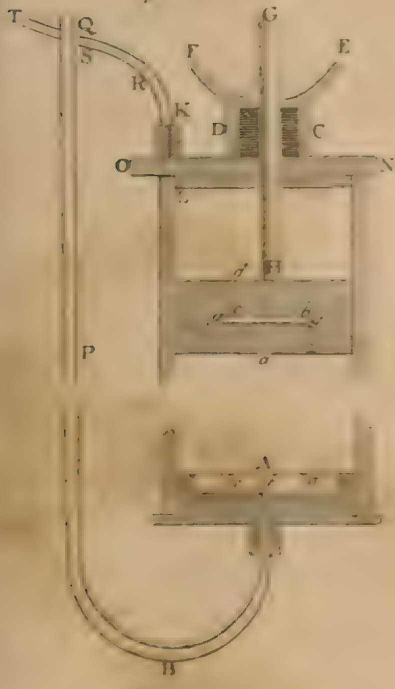

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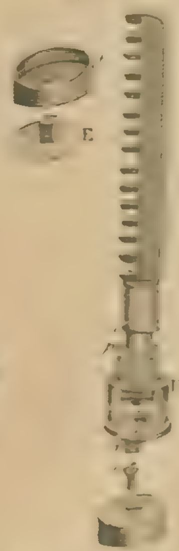

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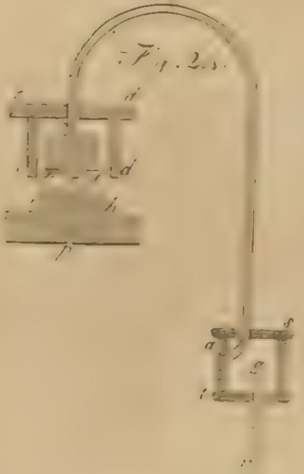

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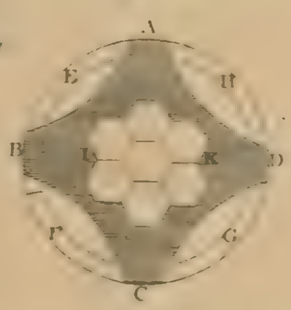

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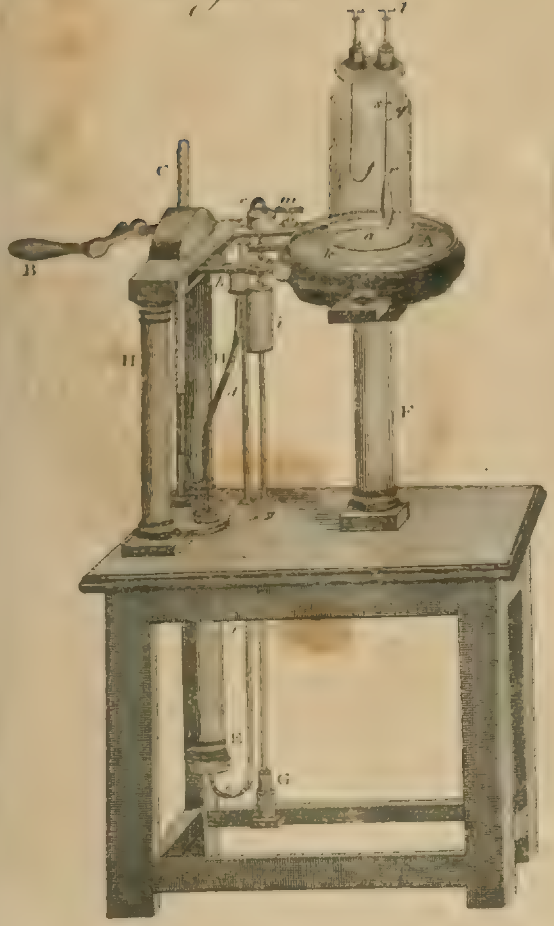

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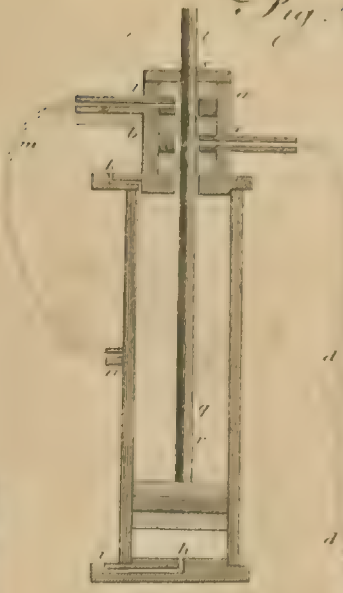

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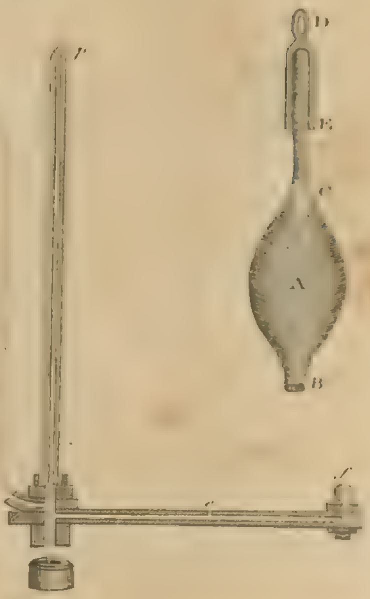

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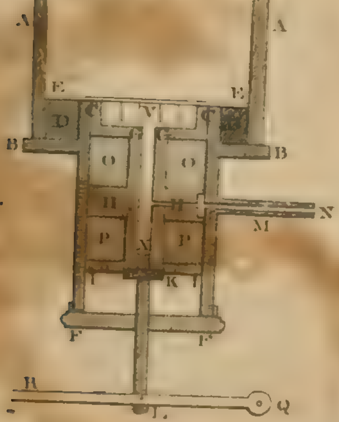

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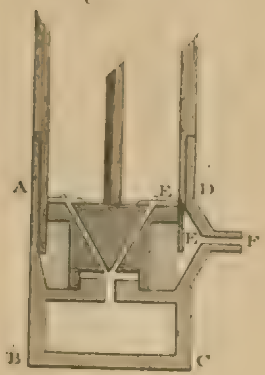

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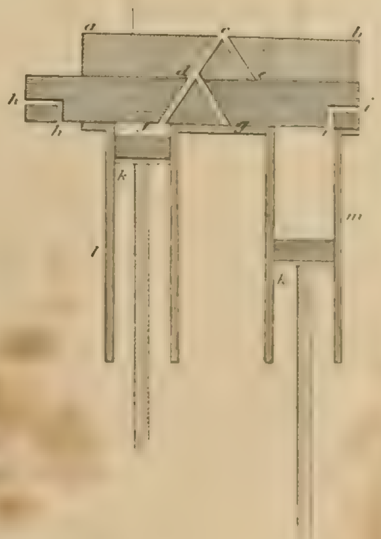
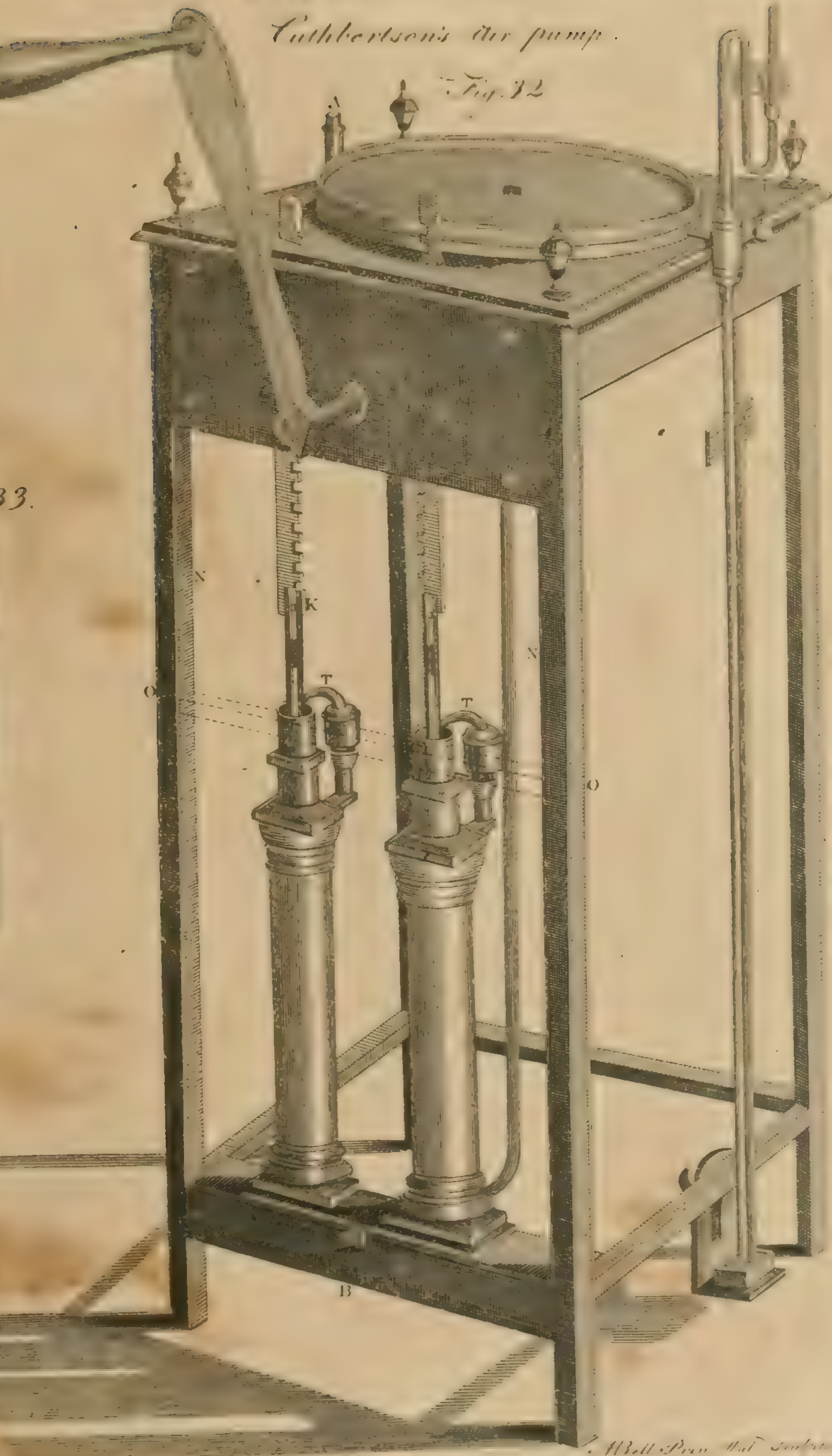


A. Bell Prin. Wal. sculptor fec.

PNEUMATICS. Plate CCCCXXVII.

Cuthbertson's Air pump.

Fig. 32



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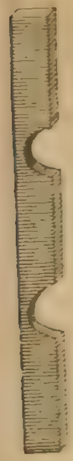

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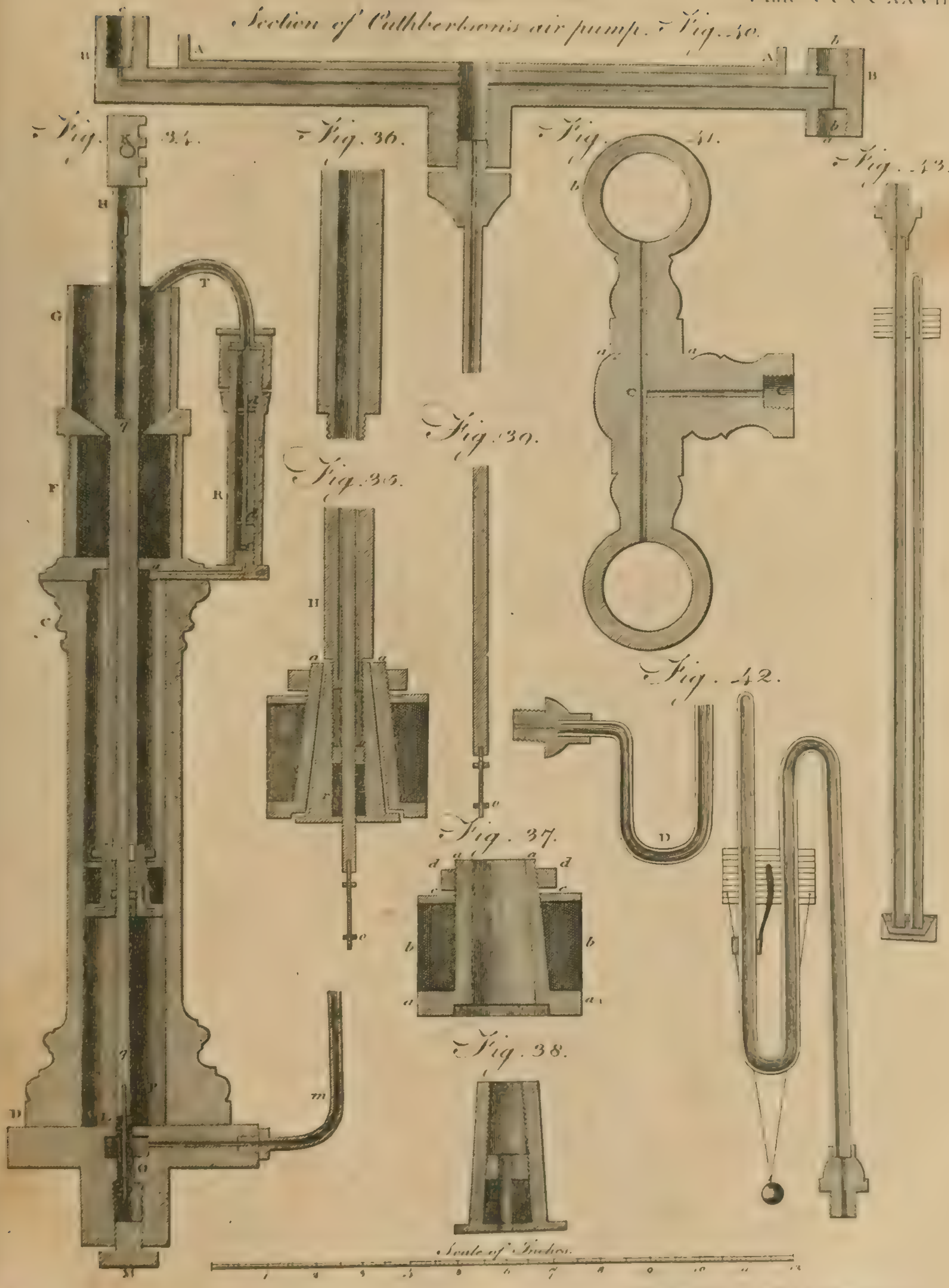
Section of Cuthbertson's air pump. Fig. 40.



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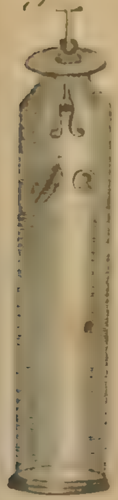

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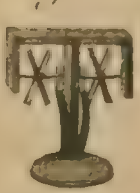

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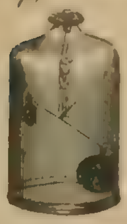

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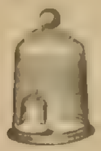
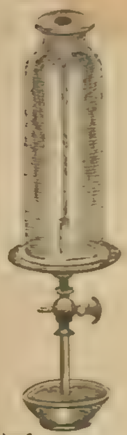


Fig. 48.

Fig. 52.



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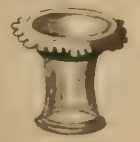

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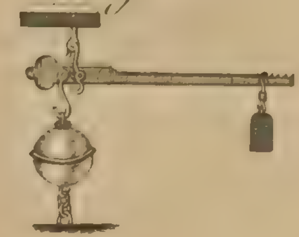

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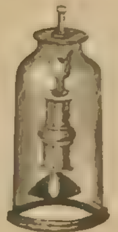

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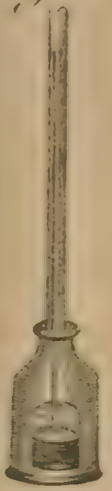

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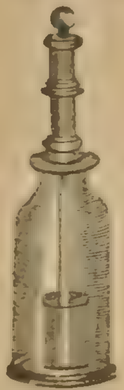

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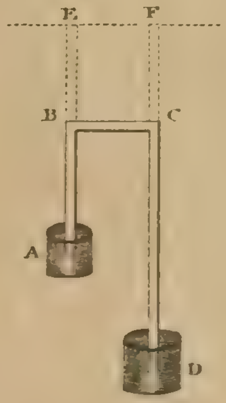

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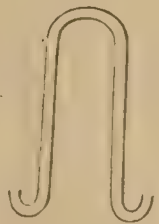

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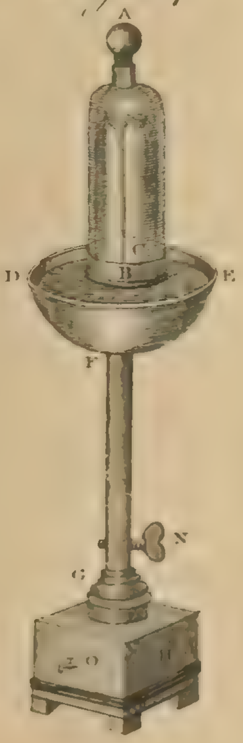

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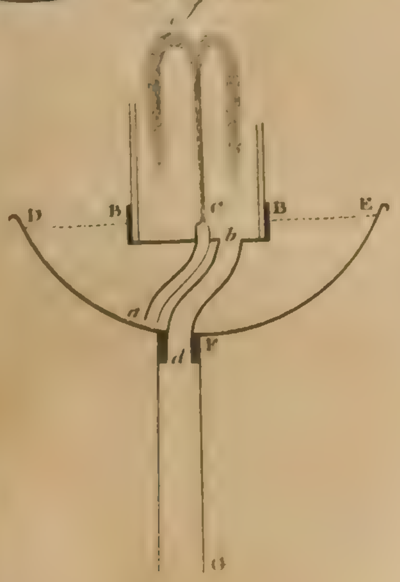

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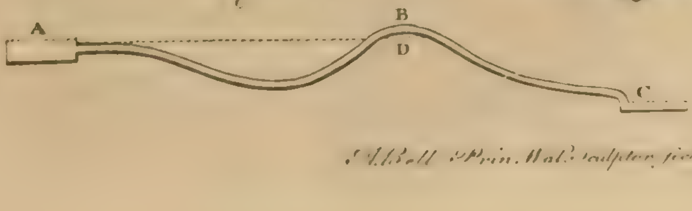

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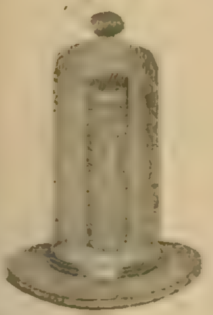
Fig. 60.



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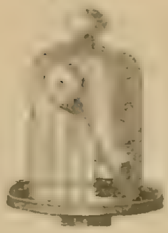

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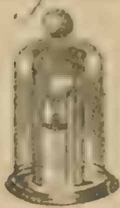

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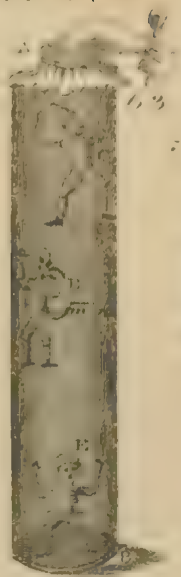

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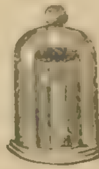

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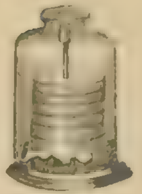

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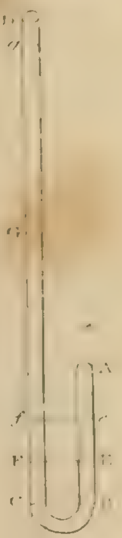

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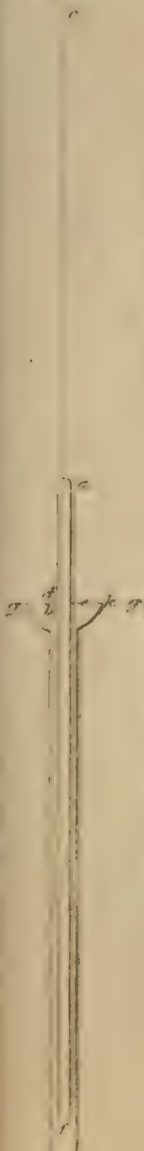

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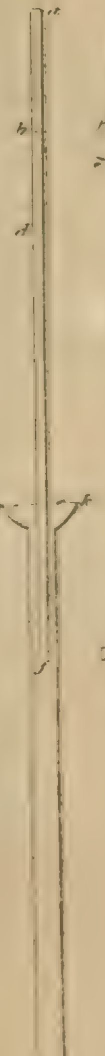

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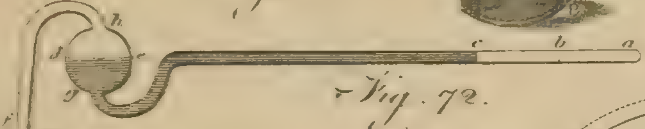

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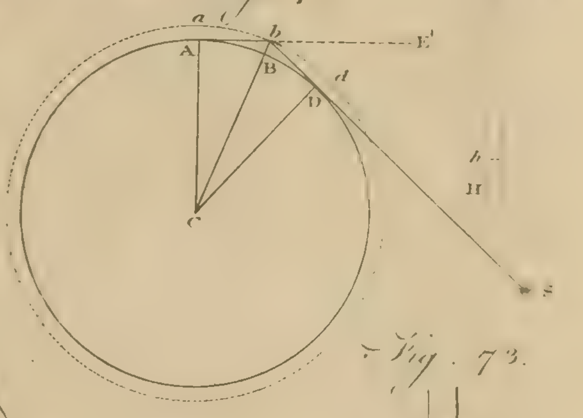

Fig. 72.

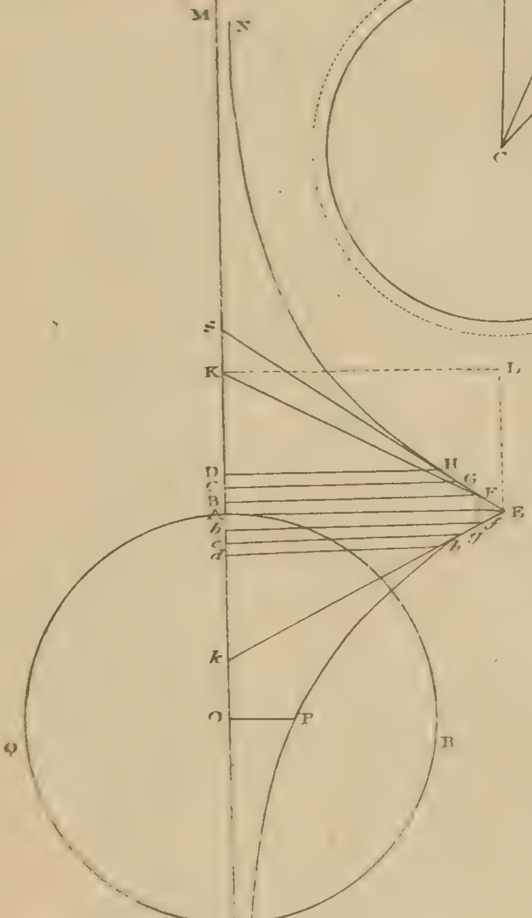

Fig. 69.

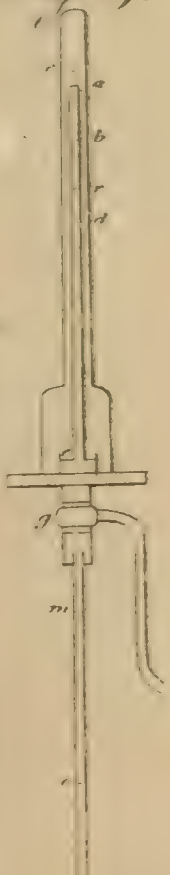

Fig. 73.

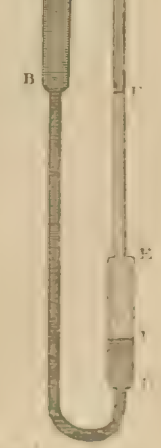

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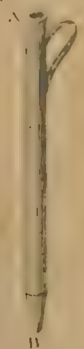
Fig. 74.



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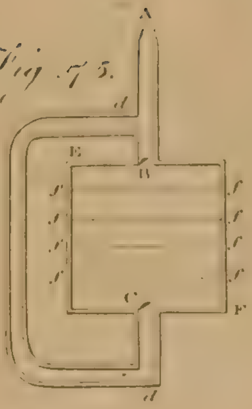

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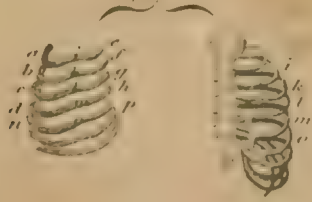
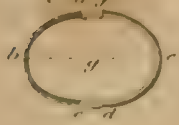


Fig. 77.



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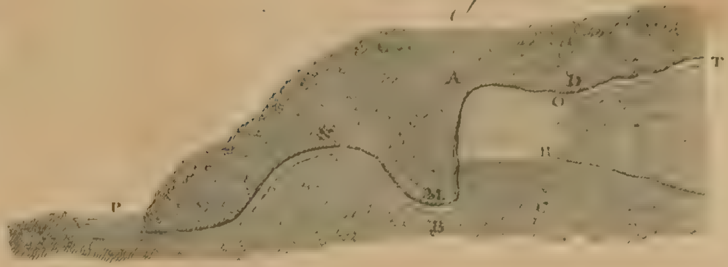

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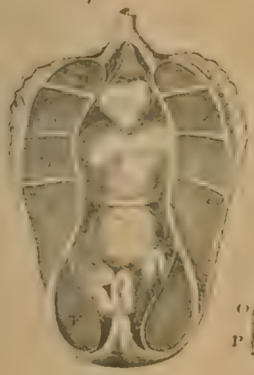

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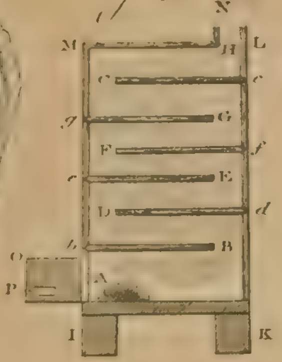

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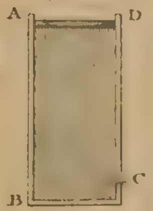

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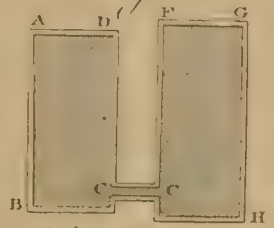

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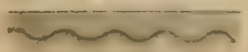

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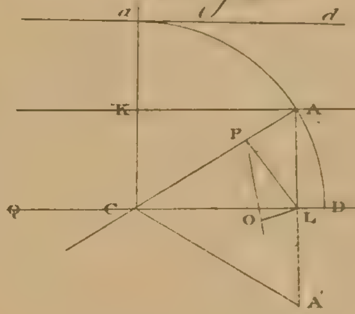

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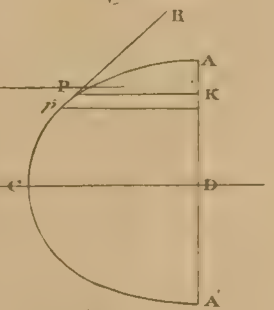

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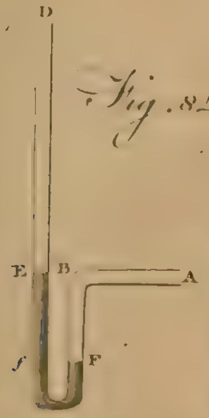

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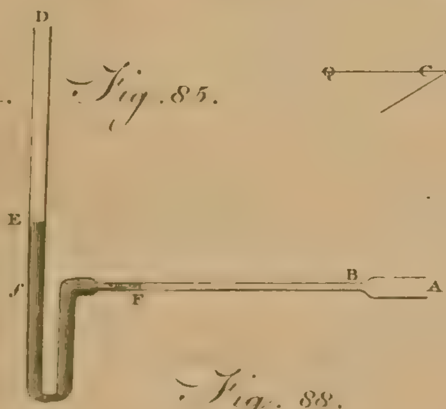

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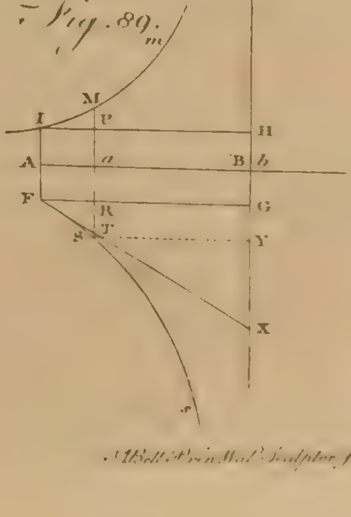

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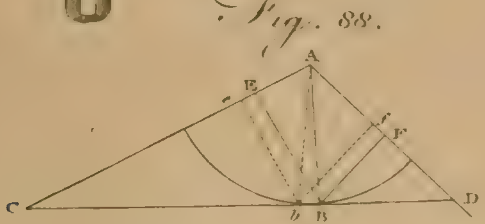

A. Bell Prin. Wal. Sculptor fecit.

Fig. 90.

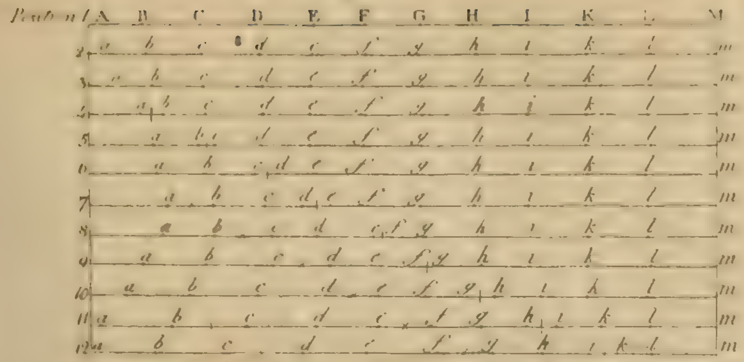
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Fig. 91.

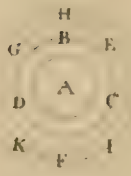

Fig. 93.

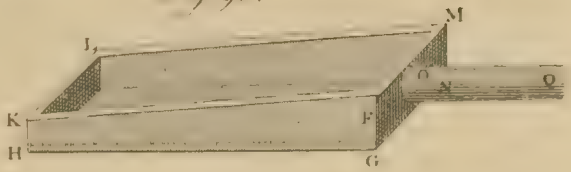

Fig. 92.

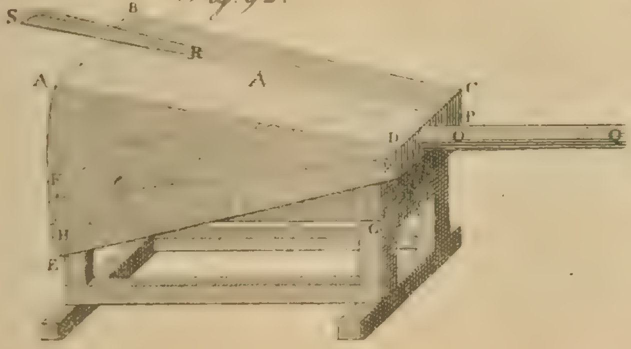

Fig. 94.

Fig. 96.

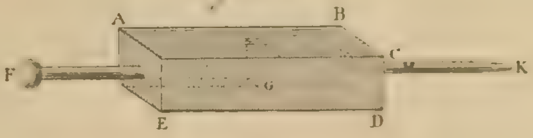

Fig. 97.

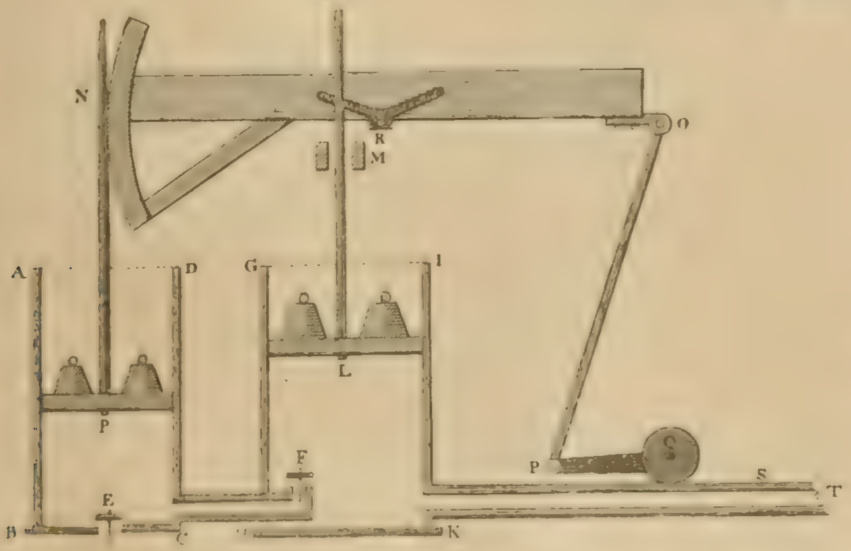

Fig. 95.

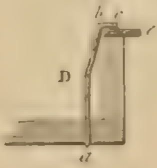

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Fig. 98

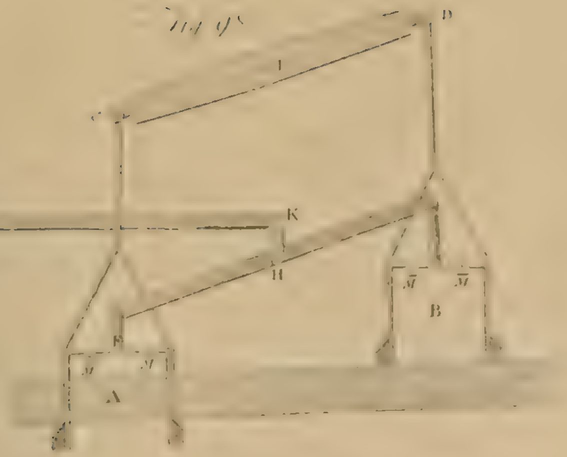


Fig. 100

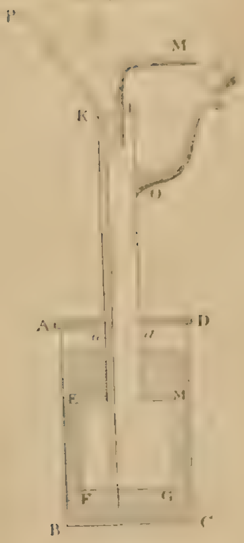


Fig. 99

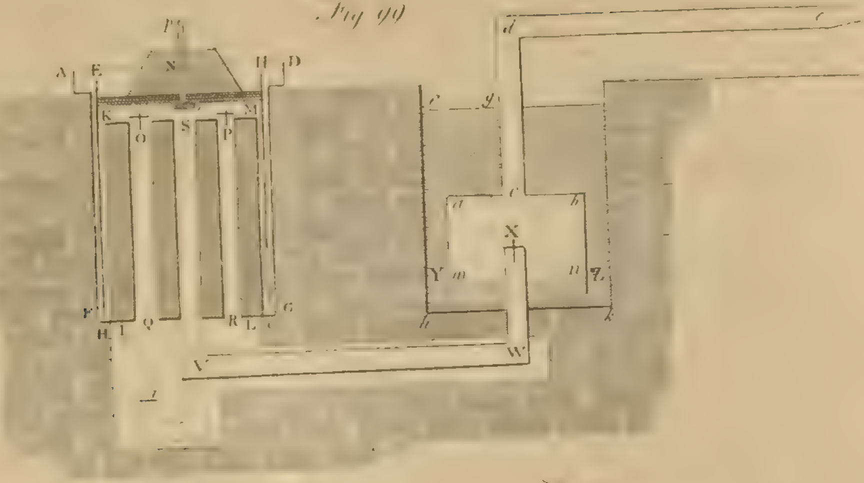


Fig. 101

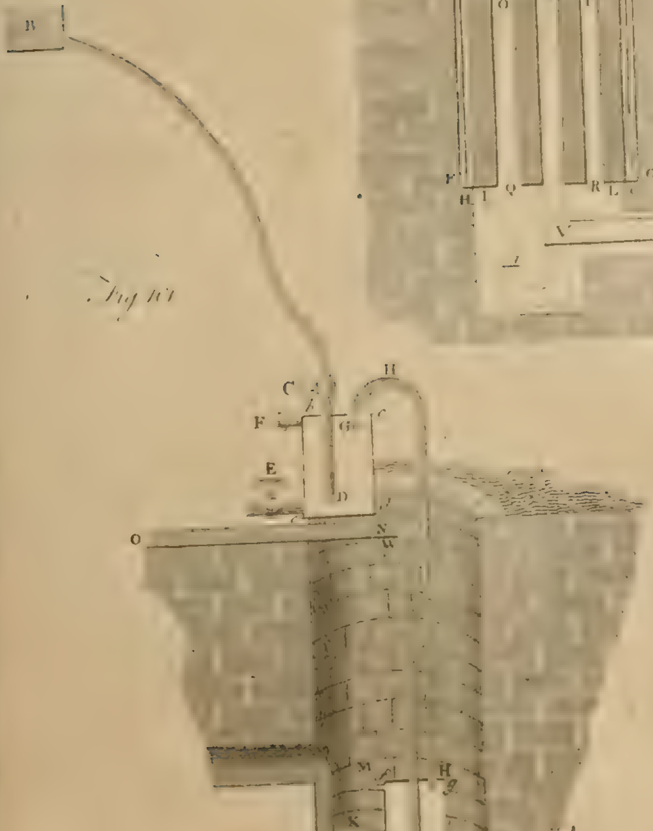
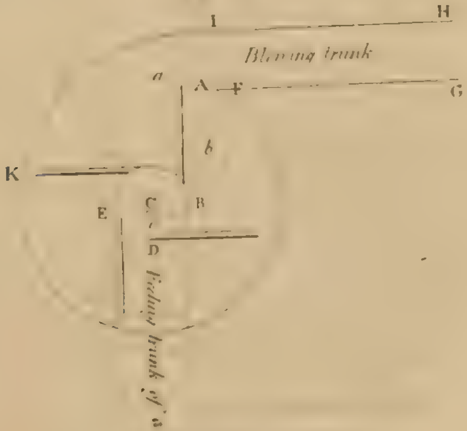


Fig. 102



may offer of making them highly uſeful. A gentleman's houſe in the country may thus be ſupplied with water by a machine that will coſt little, and hardly go out of repair.

The laſt pneumatical engine which we ſhall ſpeak of at preſent is the common fanners, uſed for winnowing grain, and for drawing air out of a room: and we have but few obſervations to make on them.

Fig. 102

The wings of the fanners are incloſed in a cylinder or drum, whoſe circular ſides have a large opening BDE (fig. 102) round the centre, to admit the air. By turning the wings rapidly round, the air is hurried round along with them, and thus acquires a centrifugal tendency, by which it preſſes ſtrongly on the outer rim of the drum: this is gradually detached from the circle as at KI, and terminated in a trunk IHGF, which goes off in a tangential direction; the air therefore is driven along this paſſage.

If the wings were diſpoſed in planes paſſing through the axis C, the compreſſion of the air by the anterior ſurface would give it ſome tendency to eſcape in every direction, and would obſtruct in ſome degree the arrival of more air through the ſide-holes. They are therefore reclined a little backward, as repreſented in the figure. It may be ſhown that their beſt form would be that of a hyperbolic ſpiral *a b c*; but the ſtraight form approaches ſufficiently near to the moſt perfect ſhape.

Much labour is loſt, however, in carrying the air round thoſe parts of the drum where it cannot eſcape. The fanners would either draw or diſcharge almoſt twice as much air if an opening were made all round one ſide. This could be gradually contracted (where required for winnowing) by a ſurrounding cone, and thus directed againſt the falling grain: this has been verified by actual trial. When uſed for drawing air out of a room for ventilation, it would be much better to remove the outer ſide of the drum entirely, and let the air fly freely off on all ſides; but the flat ſides are neceſſary, in order to prevent the air from arriving at the fanners any other way but through the central holes, to which trunks ſhould be fitted leading to the apartment which is to be ventilated.

PNEUMATOSIS. See Medicine, N° 336.

PNEUMONIA. See Medicine, N° 183.

PNEUMONICS, in *Pharmacy*, medicines proper in diſeaſes of the lungs, in which reſpiration is affected.

PO, a large and celebrated river of Italy, which has its ſource at Mount Viſs in Piedmont, and on the confines of Dauphiny. It runs through Piedmont, Montferrat, the Milaneſe, and duchy of Mantua; from thence it runs to the borders of the Parmeſan, and a part of the Modeneſe; and having entered the Ferrareſe, it begins to divide at Ficheruolo, and proceeds to diſcharge itſelf into the gulf of Venice by four principal mouths. As it paſſes along, it receives ſeveral rivers, and often overflows its banks, doing a great deal of miſchief: the reaſon of which is, that moſt of thoſe rivers deſcend from the Alps, and are increaſed by the melting of the ſnow.

POA, Meadow-grass; a genus of plants belonging to the pentandria claſs, and in the natural method ranking under the fourth order, *Gramina*. See Botany and Agriculture *Index*.

POCHETTI. See Barbatelli.

POCOCKE, Dr Edward, a learned oriental ſcholar, was the eldeſt ſon of the Rev. Edward Pococke; and was born at Oxford in 1604, where he was alſo educated. In 1628 he was admitted probationer-fellow of his college, and about the ſame time had prepared an edition of the Second Epiſtle of St Peter, the Second and Third of St John, and that of St Jude, in Syriac and Greek, with a Latin Tranſlation and Notes. In 1629 he was ordained prieſt, and appointed chaplain to the Engliſh merchants at Aleppo, where he continued five or ſix years; in which time he diſtinguiſhed himſelf by his fortitude and zeal while the plague raged there. At length returning to England, he was in 1636 appointed reader of the Arabic lectures founded by Archbiſhop Laud. Three years after he went to Conſtantinople, where he proſecuted his ſtudies of the eaſtern tongues, and procured many valuable manuſcripts. After near four years ſtay in that city, he embarked in 1640; and taking Paris in his way, viſited Gabriel Sionita the famous Maronite, and Hugo Grotius. In 1643 he was preſented to the rectory of Childrey in Berks; and about three years after married the daughter of Thomas Burdett, Eſq. About the middle of 1647 he obtained the reſtitution of the ſalary of his Arabic lecture, which had been detained from him about three years. In 1648 King Charles I. who was then priſoner in the iſle of Wight, nominated Mr Pococke to the profeſſorſhip of Hebrew, and the canonry of Chriſt-church annexed to it; but in 1650 he was ejected from his canonry for refuſing to take the engagement, and ſoon after a vote paſſed for depriving him of his Hebrew and Arabic lectures; but ſeveral governors of houſes, &c. preſenting a petition in his favour, he was ſuffered to enjoy both theſe places. He had ſome years before publiſhed his *Specimen Hiſtoriæ Arabum*; and now appeared his *Porta Moſis*: and ſoon after the Engliſh Polyglot edition of the Bible, to which he had largely contributed, and alſo Eutychius's Annals, with a Latin verſion. At the Reſtoration, he was reſtored to the canonry of Chriſt-church, and alſo received the degree of doctor of divinity. He then publiſhed his Arabic verſion of Grotius's Treatiſe of the Truth of the Chriſtian Religion; and an Arabic poem entitled *Laimato l' Ajam*, with a Latin tranſlation and notes. Soon after he publiſhed Gregory Abul Pharajius's *Hiſtoria Dynaſtiarum*. In 1674 he publiſhed an Arabic verſion of the chief parts of the Liturgy of the Church of England; and a few years after his Commentary on the Prophecies of Micah, Malachi, Hoſea, and Joel. This great man died in 1691, after having been for many years confeſſedly the firſt perſon in Europe for eaſtern learning; and was no leſs worthy of admiration for his uncommon modesty and humility, and all the virtues that can adorn a Christian. His theological works were republished at London in 1740, in two volumes in folio.

PODAGRA, or the Gout. See Medicine, Nº [illegible].

PODALIRIUS, ſon of Æſculapius and Epione, was one of the pupils of the Centaur Chiron, under whom he made himſelf ſuch a maſter of medicine, that during the Trojan war the Greeks invited him to their camp to ſtop a peſtilence which had baffled the ſkill of all their phyſicians. Some ſuppoſe, however, that he went to the Trojan war, not in the capacity of a phyſician in the Grecian army, but as a warrior, attended by his brother Machaon, in 30 ſhips, with ſoldiers from Oechalia, Ithome, and Trica. At his return Podalirius was ſhipwrecked on the coaſt of Caria, where he cured of the falling ſickneſs a daughter of the king of the place. He fixed his habitation there; and built two towns, one of which he called *Syrna*, after his wife. The Carians, on his death, built him a temple, and paid him divine honours.

PODEX, in *Anatomy*, the ſame with Anus.

PODGRAJE. See Asisia.

PODOLIA, a province of Poland, bounded on the eaſt by Volhinia and the river Ukrain; on the north and north-eaſt, by Budſiac Tartary; on the ſouth-eaſt, by the river Nieſter, which ſeparates it from Beſſarabia and Moldavia in European Turkey on the ſouth-weſt; and by the province of Red Ruſſia on the north-weſt. It is uſually divided into the Upper and Lower. In the Upper, which is the weſtern part, the chief town is Kamieck, the capital of Podolia, and of a palatinate. In the Lower or eaſtern part of Podolia the chief town is Bracklaw, the capital of a palatinate.

PODOPHYLLUM, a genus of plants belonging to the polyandria claſs; and in the natural method ranking under the 27th order, *Rhœadæ*. See Botany *Index*.

PODURA, or Springtail, a genus of inſects of the order of aptera. See Entomology *Index*.

POE-BIRD is an inhabitant of ſome of the South ſea iſlands, where it is held in great eſteem and veneration by the natives. It goes by the name of *kogo* in New Zealand; but it is better known by that of *poë-bird*. It is ſomewhat leſs than our blackbird, and is remarkable for the ſweetneſs of its note, as well as the beauty of its plumage. Its fleſh is alſo delicate food.

POECILE was a famous portico at Athens, which received its name from the variety (ποικιλος) of paintings which it contained. Zeno kept his ſchool there; and there alſo the ſtoics received their leſſons, whence their name, *ἀ ϛοα, a porch*. The Pœcile was adorned, among many others, with a picture of the ſiege and ſacking of Troy, the battle of Theſeus againſt the Amazons, and the fight between the Lacedæmonians and Athenians at Oenoe in Argolis. The only reward which Miltiades obtained after the battle of Marathon was to have his picture drawn more conſpicuous than that of the reſt of the officers that fought with him, in the repreſentation which was made of the engagement, and which was hung up in the Pœcile in commemoration of that celebrated victory.

POEM, a poetical compoſition. See Poetry.

POESTUM or Posidonia, an ancient city of Grecia Magna, now part of the kingdom of Naples. It was founded by one of thoſe colonies from Greece which in the early ages eſtabliſhed themſelves in Italy; and it flouriſhed before the foundation of Rome itſelf. It was deſtroyed by the Goths on the decline of the Roman empire, who in their barbarous zeal for the Chriſtian religion overturned every place of Pagan worſhip which was expoſed to their ravages. Since that time it has been in ruins; and theſe ruins were unknown till they were diſcovered in the following manner: "In the year 1755 (ſays the author of the *Antiquities, Hiſtory, and Views of Pæſtum*), an apprentice to a painter at Naples, who was on a viſit to his friends at Capaccio, by accident took a walk to the mountains which ſurround the territory of Pœſtum. The only habitation he perceived was the cottage of a farmer, who cultivated the beſt part of the ground, and reſerved the reſt for paſture. The ruins of the ancient city made a part of this view, and particularly ſtruck the eyes of the young painter; who, approaching nearer, ſaw with aſtoniſhment walls, towers, gates and temples. Upon his return to Capaccio, he conſulted the neighbouring people about the origin of theſe monuments of antiquity. He could only learn, that this part of the country had been uncultivated and abandoned during their memory; that about ten years before, the farmer, whoſe habitation he had noticed, eſtabliſhed himſelf there; and that having dug in many places and ſearched among the ruins that lay round him, he had found treaſures ſufficient to enable him to purchaſe the whole. At the painter's return to Naples, he informed his maſter of theſe particulars, whoſe curioſity was ſo greatly excited by the deſcription, that he took a journey to the place, and made drawings of the principal views. Theſe were ſhown to the king of Naples, who ordered the ruins to be cleared, and Pœſtum aroſe from the obſcurity in which it had remained for upwards of 700 years, as little known to the neighbouring inhabitants as to travellers."

Our author gives the following deſcription of it in its preſent ſtate. It is, ſays he, of an oblong figure, about two miles and a half in circumference. It has four gates, which are oppoſite to each other. On the key-ſtone of the arch of the north gate, on the outſide, is the figure of Neptune in baſſo relievo, and within a hippocampus. The walls which ſtill remain are compoſed of very large cubical ſtones, and are extremely thick, in ſome parts 18 feet. That the walls have remained unto this time is owing to the very exact manner in which the ſtones are fitted to one another (a circumſtance obſerved univerſally in the maſonry of the ancients), and perhaps in ſome meaſure to a ſtalactical concretion which has grown over them. On the walls here and there are placed towers of different heights; thoſe near the gates being much higher and larger than the others, and evidently of modern workmanſhip. He obſerves, that, from its ſituation among marſhes, bituminous and ſulphureous ſprings, Pœſtum muſt have been unwholeſome; a circumſtance mentioned by Strabo, *Morboſam eam facit fluvius in paludes diffuſus*. In ſuch a ſituation the water muſt have been bad. Hence the inhabitants were obliged to convey that neceſſary of life from purer ſprings by means of aqueducts, of which many veſtiges ſtill remain.

The principal monuments of antiquity are a theatre, an amphitheatre, and three temples. The theatre and amphitheatre are much ruined. The firſt temple is hexastylos, and amphiprostylos. At one end, the pilasters and two columns which divided the cella from the pronaos are still remaining. Within the cella are two rows of smaller columns, with an architrave, which support the second order. This temple our author takes to be of that kind called by Vitruvius *hypæthros*, and supports his opinion by a quotation from that author. The second temple is also amphiprostylos: it has nine columns in front and 18 in flank, and seems to be of that kind called by Vitruvius *pſeudodipteros*. The third is likewiſe amphiprostylos. It has ſix columns in front and 13 in flank. Vitruvius calls this kind of temple *peripteros*. "The columns of theſe temples (ſays our author) are of that kind of Doric order which we find employed in works of the greateſt antiquity. They are hardly five diameters in height. They are without baſes, which alſo has been urged as a proof of their antiquity; but we do not find that the ancients ever uſed baſes to this order, at leaſt till very late. Vitruvius makes no mention of baſes for this order; and the only inſtance we have of it is in the firſt order of the Coliſeum at Rome, which was built by Veſpaſian. The pillars of theſe temples are fluted with very ſhallow flutings in the manner deſcribed by Vitruvius. The columns diminiſh from the bottom, which was the moſt ancient method almoſt univerſally in all the orders. The columns have aſtragals of a very ſingular form; which ſhows the error of thoſe who imagine that this member was firſt invented with the Ionic order, to which the Greeks gave an aſtragal, and that the Romans were the firſt who applied it to the Doric. The echinus of the Capitol is of the ſame form with that of the temple of Corinth deſcribed by Le Roy." See *Swinburne's Travels in the Two Sicilies*, vol. ii. p. 131—140.

POET, the author of a poem. See the article Poetry.

Provençal Poets. See Troubadours.

POETRY.

AMIDST thoſe thick clouds which envelope the firſt ages of the world, reaſon and hiſtory throw ſome lights on the origin and primitive employment of this divine art. Reaſon ſuggeſts, that before the invention of letters, all the people of the earth had no other method of tranſmitting to their deſcendants the principles of their worſhip, their religious ceremonies, their laws, and the renowned actions of their ſires and heroes, than by poetry; which included all theſe objects in a kind of hymns that fathers ſung to their children, in order to engrave them with indelible ſtrokes in their hearts. Hiſtory not only informs us, that Moſes and Miriam, the firſt authors that are known to mankind, ſung, on the borders of the Red ſea, a ſong of divine praiſe, to celebrate the deliverance which the Almighty had vouchſafed to the people of Iſrael, by opening a paſſage to them through the waters; but it has alſo tranſmitted to us the ſong itſelf, which is at once the moſt ancient monument and a maſterpiece of poetic compoſition.

1
Origin of poetry.

The Greeks, a people the moſt ingenious, the moſt animated, and in every ſenſe the moſt accompliſhed, that the world ever produced—ſtrove to raviſh from the Hebrews the precious gift of poetry, which was vouchſafed them by the Supreme Author of all nature, that they might aſcribe it to their falſe deities. According to their ingenious fictions, Apollo became the god of poetry, and dwelt on the hills of Phocis, Parnaſſus, and Helicon, whoſe feet were waſhed by the waters of Hippocrene, of which each mortal that ever drank was ſeized with a ſacred delirium. The immortal ſwans floated on its waves. Apollo was accompanied by the Muſes—thoſe nine learned ſiſters—the daughters of Memory: and he was conſtantly attended by the Graces. Pegaſus, his winged courſer, tranſported him with a rapid flight into all the regions of the univerſe. Happy emblems! by which we at this day embelliſh our poetry, as no one has ever yet been able to invent more brilliant images.

The literary annals of all nations afford veſtiges of poetry from the remoteſt ages. They are found among the moſt ſavage of the ancient barbarians, and the moſt deſolate of all the Americans. Nature aſſerts her rights in every country and every age. Tacitus mentions the verſes and the hymns of the Germans, at the time when that rough people yet inhabited the woods, and while their manners were ſtill ſavage. The firſt inhabitants of Runnia and the other northern countries, thoſe of Gaul, Albion, Iberia, Auſonia, and other nations of Europe, had their poetry, as well as the ancient people of Aſia, and of the known borders of Africa. But the ſimple productions of nature have conſtantly ſomething unformed, rough, and ſavage. The Divine Wiſdom appears to have placed the ingenious and poliſhed part of mankind on the earth, in order to refine that which comes from her boſom rude and imperfect: and that art has poliſhed poetry, which iſſued quite naked and ſavage from the brains of the firſt of mankind.

Definition of poetry.

But what is Poetry? It would be to abridge the limits of the poetic empire, to contract the ſphere of this divine art, ſhould we ſay, in imitation of all the dictionaries and other treatiſes on verſification, That *poetry is the art of making verſes, of lines or periods that are in rhyme or metre.* This is rather a grammatical explanation of the word, than a real definition of the thing, and it would be to degrade poetry thus to define it. The father of criticiſm has denominated poetry τεχνη μιμητικη, *an imitative art*: but this, though juſt in itſelf, is too general for a definition, as it does not diſcriminate poetry from other arts which depend equally on imitation. The juſteſt definition ſeems to be that given by Baron Bielfeld *, *That poetry is the art of expreſſing our thoughts in fiction.* In fact, it is after this manner (if we reflect with attention) that all the metaphors and allegories, all the various kinds of fiction, form the firſt materials of a poetic edifice: it is thus that all images, all compariſons, alluſions, and figures, eſpecially thoſe which perſonify moral ſubjects, as virtues and vices, concur to the decoration of ſuch ſtructure. A work, therefore, that is filled with invention, that inceſſantly preſents images which render the reader attentive and affected, where the author gives intereſting ſentiments to every thing that he makes ſpeak, and where he makes ſpeak by ſenſible figures all thoſe objects which would affect the mind but weakly when clothed in a ſimple proſaic ſtyle, ſuch a work is a poem. While that, though it be in verſe, which is of a didactic, dogmatic, or moral nature, and where the objects are preſented in a manner quite ſimple, without fiction, without images or ornaments, cannot be called *poetry*, but merely a work in verſe; for the art of reducing thoughts, maxims, and periods, into rhyme or metre, is very different from the art of poetry.

An ingenious fable, a lively and intereſting romance, a comedy, the ſublime narrative of the actions of a hero, ſuch as the Telemachus of M. Fenelon, though written in proſe, but in meaſured proſe, is therefore a work of poetry: becauſe the foundation and the ſuperſtructure are the productions of genius, as the whole proceeds from fiction; and truth itſelf appears to have employed an innocent and agreeable deception to inſtruct with efficacy. This is ſo true, that the pencil alſo, in order to pleaſe and affect, has recourſe to fiction; and this part of painting is called the *poetic compoſition of a picture*. It is therefore by the aid of fiction that poetry, ſo to ſpeak, paints its expreſſions, that it gives a body and a mind to its thoughts, that it animates and exalts that which would otherwiſe have remained arid and inſenſible. It is the peculiar privilege of poetry to exalt inanimate things into animals, and abſtract ideas into perſons. The former licence is ſo common, that it is now conſidered as nothing more than a characteriſtical dialect appropriated by the poets to diſtinguiſh themſelves from the writers of proſe; and it is at the ſame time ſo eſſential, that we queſtion much if this ſpecies of compoſition could ſubſiſt without it: for it will perhaps, upon examination, be found, that in every poetical deſcription ſome of the qualities of Animal Nature are aſcribed to things not having life. Every work, therefore, where the thoughts are expreſſed by fictions or images, is poetic; and every work where they are expreſſed naturally, ſimply, and without ornament, although it be in verſe, is proſaic.

Verſe, however, is not to be regarded as foreign or ſuperfluous to poetry. To reduce thoſe images, thoſe fictions, into verſe, is one of the greateſt difficulties in poetry, and one of the greateſt merits in a poem: and for theſe reaſons, the cadence, the harmony of ſounds, particularly that of rhyme, delight the ear to a high degree, and the mind inſenſibly repeats them while the eye reads them. There reſults therefore a pleaſure to the mind, and a ſtrong attachment to theſe ornaments: but this pleaſure would be frivolous, and even childiſh, if it were not attended by a real utility. Verſes were invented in the firſt ages of the world, merely to aid and to ſtrengthen the memory: for cadence, harmony, and eſpecially rhyme, afford the greateſt aſſiſtance to the memory that art can invent; and the images, or poetic fictions, that ſtrike our ſenſes, aſſiſt in graving them with ſuch deep traces in our minds, as even time itſelf frequently cannot efface. How many excellent apophthegms, ſentences, maxims, and precepts, would have been buried in the abyſs of oblivion, if poetry had not preſerved them by its harmony? To give more efficacy to this lively impreſſion, the firſt poets ſung their verſes, and the words and phraſes muſt neceſſarily have been reduced, at leaſt to cadence, or they could not have been ſuſceptible of muſical expreſſion. One of the great excellencies, therefore, though not a neceſſary conſtituent of poetry, conſiſts in its being expreſſed in verſe. See Part III.

3
Verſe, though not eſſential to poetry, one of its excellencies.

Part I. GENERAL PRINCIPLES of the ART.

Sect. I. *Of the Eſſence and End of Poetry.*

4
Eſſence of poetry.

THE *eſſence* of *Polite ARTS* in general, and conſequently of poetry in particular, conſiſts in *expreſſion*; and we think that, to be poetic, the expreſſion muſt neceſſarily ariſe from *fiction*, or invention. (See the article ART, particularly from N° 12. to the end.) This invention, which is the fruit of happy genius alone, ariſes, 1. From the ſubject itſelf of which we undertake to treat: 2. From the manner in which we treat that ſubject, or the ſpecies of writing of which we make uſe: 3. From the plan that we propoſe ſo follow in conformity to this manner: and, 4. From the method of executing this plan in its full detail. Our firſt guides, the ancients, afford us no lights that can elucidate all theſe objects in general. The precepts which Ariſtotle lays down, relate to epic and dramatic poetry only: and which, by the way, confirms our idea, that antiquity itſelf made the eſſence of poetry to conſiſt in fiction, and not in that ſpecies of verſe which is deſtitute of it, or in that which is not capable of it. But ſince this art has riſen to a great degree of perfection; and as poetry, like electricity, communicates its fire to every thing it touches, and animates and embelliſhes whatever it treats; there ſeems to be no ſubject in the univerſe to which poetry cannot be applied, and which it cannot render equally brilliant and pleaſing. From this univerſality of poetry, from its peculiar property of expreſſion by fiction, which is applicable to all ſubjects, have ariſen its different ſpecies, of which a particular deſcription will be given in the *ſecond* part.

Horace, in a well-known verſe, has been ſuppoſed to declare the *end* of poetry to be twofold, to pleaſe, or to inſtruct:

> *Aut prodeſſe volunt, aut delectare poetæ.*

5
End of poetry.

But Dr Beattie * maintains, that the ultimate end of this art is to pleaſe; inſtruction being only one of the means (and not always a neceſſary one) by which that ultimate end is to be accompliſhed. The paſſage rightly underſtood, he obſerves, will not appear to contain any thing inconſiſtent with this doctrine. The author is there ſtating a compariſon between the Greek and Roman writers, with a view to the poetry of the ſtage; and, after commending the former for their correctneſs, and for the liberal ſpirit wherewith they conducted their literary labours, and blaming his countrymen for their

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* *Eſſays on Poetry and Muſic*, part i. chap. i.

Eſſence and End of Poetry.

inaccuracy and avarice, he proceeds thus: "The ends propoſed by our dramatic poets (or by poets in general) are, to pleaſe, to inſtruct, or to do both. When inſtruction is your aim, let your moral ſentences be expreſſed with brevity, that they may be readily underſtood, and long remembered: where you mean to pleaſe, let your fictions be conformable to truth or probability. The elder part of your audience (or readers) have no reliſh for poems that give pleaſure only without inſtruction; nor the younger for ſuch writings as give inſtruction without pleaſure. He only can ſecure the univerſal ſuffrage in his favour, who blends the uſeful with the agreeable, and delights at the ſame time that he inſtructs the reader. Such are the works that bring money to the bookſeller, that paſs into foreign countries, and perpetuate the author's name through a long ſucceſſion of ages †."—Now, what is the meaning of all this? What, but that to the *perfection* of dramatic poetry (or, if you pleaſe, of poetry in general) both ſound morals and beautiful fiction are requiſite? But Horace never meant to ſay, that inſtruction, as well as pleaſure, is neceſſary to give to any compoſition the *poetical character;* or he would not in another place have celebrated with ſo much affection and rapture the melting ſtrains of Sappho, and the playful genius of Anacreon ‡,—two authors tranſcendently ſweet, but not remarkably inſtructive. We are ſure, that pathos, and harmony, and elevated language, were, in Horace's opinion, eſſential to poetry §; and of theſe decorations nobody will affirm that inſtruction is the end, who conſiders that the moſt inſtructive books in the world are written in plain proſe.

In ſhort, our author has endeavoured by many ingenious arguments and illuſtrations to eſtabliſh it as a truth in criticiſm, that the end of poetry is *to pleaſe.* Verſes, if pleaſing, may be poetical, though they convey little or no inſtruction; but verſes, whoſe ſole merit it is that they convey inſtruction, are not poetical. Inſtruction, however, he admits, eſpecially in poems of length, is neceſſary to their *perfection*, becauſe they would not be *perfectly agreeable* without it.

SECT. II. *Of the Standard of Poetical Invention.*

6
Poetical nvention o be regulated

HOMER's beautiful deſcription of the heavens and earth, as they appear in a calm evening by the light of the moon and ſtars, concludes with this circumſtance, "And the heart of the ſhepherd is glad *." Madame Dacier, from the turn ſhe gives to the paſſage in her verſion, ſeems to think, and Pope, in order perhaps to make out his couplet, inſinuates, that the gladneſs of the ſhepherd is owing to his ſenſe of the utility of thoſe luminaries. And this may in part be the caſe: but this is not in Homer; nor is it a neceſſary conſideration. It is true, that, in contemplating the material univerſe, they who diſcern the cauſes and effects of things muſt be more rapturouſly entertained than thoſe who perceive nothing but ſhape and ſize, colour and motion. Yet, in the mere outſide of Nature's work, there is a ſplendor and a magnificence to which even untutored minds cannot attend without great delight.

eattie's Eſſays, Part i. hap. 2.

Not that all peaſants or all philoſophers are equally ſuſceptible of theſe charming impreſſions. It is ſtrange to obſerve the callouſneſs of ſome men, before whom all the glories of heaven and earth paſs in daily ſucceſſion, without touching their hearts, elevating their fancy, or leaving any durable remembrance. Even of thoſe who pretend to ſenſibility, how many are there to whom the luſtre of the riſing or ſetting ſun; the ſparkling concave of the midnight-ſky; the mountain-foreſt toſſing and roaring to the ſtorm, or warbling with all the melodies of a ſummer-evening; the ſweet interchange of hill and dale, ſhade and ſunſhine, grove, lawn, and water, which an extenſive landſcape offers to the view; the ſcenery of the ocean, ſo lovely, ſo majeſtic, and ſo tremendous; and the many pleaſing varieties of the animal and vegetable kingdoms, could never afford ſo much real ſatisfaction, as the ſteams and noiſe of a ball-room, the inſipid fiddling and ſqueaking of an opera, or the vexations and wranglings of a card-table!

Of Invention.

But ſome minds there are of a different make; who, even in the early part of life, receive from the contemplation of Nature a ſpecies of delight which they would hardly exchange for any other, and who, as avarice and ambition are not the infirmities of that period, would, with equal ſincerity and rapture, exclaim,

> I care not, Fortune, what you me deny;
> You cannot rob me of free Nature's grace;
> You cannot ſhut the windows of the ſky,
> Through which Aurora ſhows her bright'ning face;
> You cannot bar my conſtant feet to trace
> The woods and lawns by living ſtream at eve.
> *Caſtle of Indolence.*

Such minds have always in them the ſeeds of true taſte, and frequently of imitative genius. At leaſt, though their enthuſiaſtic or viſionary turn of mind (as the man of the world would call it) ſhould not always incline them to practiſe poetry or painting, we need not ſcruple to affirm, that without ſome portion of this enthuſiaſm no perſon ever became a true poet or painter. For he who would imitate the works of nature, muſt firſt accurately obſerve them; and accurate obſervation is to be expected from thoſe only who take great pleaſure in it.

To a mind thus diſpoſed no part of creation is indifferent. In the crowded city and howling wilderneſs; in the cultivated province and ſolitary iſle; in the flowery lawn and craggy mountain; in the murmur of the rivulet and in the uproar of the ocean; in the radiance of ſummer and gloom of winter; in the thunder of heaven and in the whiſper of the breeze; he ſtill finds ſomething to rouze or to ſoothe his imagination, to draw forth his affections, or to employ his underſtanding. And from every mental energy that is not attended with pain, and even from ſome of thoſe that are, as moderate terror and pity, a ſound mind derives ſatiſfaction; exerciſe being equally neceſſary to the body and the ſoul, and to both equally productive of health and pleaſure.

This happy ſenſibility to the beauties of nature ſhould be cheriſhed in young perſons. It engages them to contemplate the Creator in his wonderful works; it purifies and harmonizes the ſoul, and prepares it for moral and intellectual diſcipline; it ſupplies an endleſs ſource of amuſement; it contributes even to bodily health: and, as a ſtrict analogy ſubſiſts between material and moral beauty, it leads the heart by an eaſy tranſition from the one to the other; and thus recommends virtue for its tranſcendant lovelineſs, and makes vice appear the object of contempt and abomination. An intimate acquaintance with the beſt deſcriptive poets, Spenſer, Milton, and Thomſon, but above all with the divine Georgic, joined to ſome practice in the art of drawing, will promote this amiable ſenſibility in early years: for then the face of nature has novelty ſuperadded to its other charms, the paſſions are not pre-engaged, the heart is free from care, and the imagination warm and romantic.

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† *Hor. Ar. Poet.* 333—347.

‡ *Hor. Carm.* lib. iv. ode 9.

§ *Hor. Sat.* lib. i. ſat. 4. ver. 40.

* *Iliad*, viii. 555.

7
by the ſtandard of nature.

But not to inſiſt longer on thoſe ardent emotions that are peculiar to the enthuſiaſtic diſciple of nature, may it not be affirmed of all men, without exception, or at leaſt of all the enlightened part of mankind, that they are gratified by the contemplation of things natural, as oppoſed to unnatural? Monſtrous ſights pleaſe but for a moment, if they pleaſe at all; for they derive their charm from the beholder's amazement, which is quickly over. We read indeed of a man of rank in Sicily *, who chooſes to adorn his villa with pictures and ſtatues of moſt unnatural deformity: but it is a ſingular inſtance; and one would not be much more ſurpriſed to hear of a perſon living without food, or growing fat by the uſe of poiſon. To ſay of any thing, that it is *contrary to nature*, denotes cenſure and diſguſt on the part of the ſpeaker; as the epithet *natural* intimates an agreeable quality, and ſeems for the moſt part to imply, that a thing is as it ought to be, ſuitable to our own taſte, and congenial with our own conſtitution. Think with what ſentiments we ſhould peruſe a poem, in which nature was totally miſrepreſented, and principles of thought and of operation ſuppoſed to take place, repugnant to every thing we had ſeen or heard of:—in which, for example, avarice and coldneſs were aſcribed to youth, and prodigality and paſſionate attachment to the old; in which men were made to act at random, ſometimes according to character, and ſometimes contrary to it; in which cruelty and envy were productive of love, and beneficence and kind affection of hatred: in which beauty was invariably the object of diſlike, and uglineſs of deſire; in which ſociety was rendered happy by atheiſm and the promiſcuous perpetration of crimes, and juſtice and fortitude were held in univerſal contempt. Or think, how we ſhould reliſh a painting, where no regard was had to the proportions, colours, or any of the phyſical laws, of Nature:—where the ears and eyes of animals were placed in their ſhoulders; where the ſky was green and the graſs crimſon; where trees grew with their branches in the earth and their roots in the air; where men were ſeen fighting after their heads were cut off, ſhips ſailing on the land, lions entangled in cobwebs, ſheep preying on dead carcaſes, fiſhes ſporting in the woods, and elephants walking on the ſea. Could ſuch figures and combinations give pleaſure, or merit the appellation of ſublime or beautiful? Should we heſitate to pronounce their author mad? And are the abſurdities of madmen proper ſubjects either of amuſement or of imitation to reaſonable beings?

Let it be remarked, too, that though we diſtinguiſh our internal powers by different names, becauſe otherwiſe we could not ſpeak of them ſo as to be underſtood, they are all but ſo many energies of the ſame individual mind; and therefore it is not to be ſuppoſed, that what contradicts any one leading faculty ſhould yield permanent delight to the reſt. That cannot be agreeable to reaſon, which conſcience diſapproves; nor can that gratify imagination, which is repugnant to reaſon.——Beſides, belief and acquieſcence of mind are pleaſant, as diſtruſt and diſbelief are painful: and therefore, that only can give ſolid and general ſatisfaction, which has ſomething of plauſibility in it; ſomething which we conceive it poſſible for a rational being to believe. But no rational being can acquieſce in what is obviouſly contrary to nature, or implies palpable abſurdity.

Poetry, therefore, and indeed every art whoſe end is to pleaſe, muſt be natural; and if ſo, muſt exhibit real matter of fact, or ſomething like it; that is, in other words, muſt be either according to truth or according to veriſimilitude.

And though every part of the material univerſe abounds in objects of pleaſurable contemplation, yet nothing in nature ſo powerfully touches our hearts, or gives ſo great variety of exerciſe to our moral and intellectual faculties, as man. Human affairs and human feelings are univerſally intereſting. There are many who have no great reliſh for the poetry that delineates only irrational or inanimate beings; but to that which exhibits the fortunes, the characters, and the conduct of men, there is hardly any perſon who does not liſten with ſympathy and delight. And hence to imitate human action, is conſidered by Ariſtotle as eſſential to this art; and muſt be allowed to be eſſential to the moſt pleaſing and moſt inſtructive part of it, Epic and Dramatic compoſition. Mere deſcriptions, however beautiful, and moral reflections, however juſt, become tireſome, where our paſſions are not occaſionally awakened by ſome event that concerns our fellow-men. Do not all readers of taſte receive peculiar pleaſure from thoſe little tales or epiſodes with which Thomſon's deſcriptive poem on the Seaſons is here and there enlivened? and are they not ſenſible, that the thunder-ſtorm would not have been half ſo intereſting without the tale of the two lovers (*Summ.* v. 1171); nor the harveſt-ſcene, without that of Palemon and Lavinia (*Aut.* v. 177.); nor the driving ſnows, without that exquiſite picture of a man periſhing among them (*Winter*, v. 276.)? It is much to be regretted, that Young did not employ the ſame artifice to animate his Night-Thoughts. Sentiments and deſcriptions may be regarded as the pilaſters, carvings, gildings, and other decorations of the poetical fabric: but human actions are the columns and the rafters that give it ſtability and elevation. Or, changing the metaphor, we may conſider theſe as the ſoul which informs the lovely frame; while thoſe are little more than the ornaments of the body.

Whether the pleaſure we take in things natural, and our diſlike to what is the reverſe, be the effect of habit or of conſtitution, is not a material inquiry. There is nothing abſurd in ſuppoſing, that between the ſoul, in its firſt formation, and the reſt of nature, a mutual harmony and ſympathy may have been eſtabliſhed, which experience may indeed confirm, but no perverſe habits could entirely ſubdue. As no ſort of education could make man believe the contrary of a ſelf-evident axiom, or reconcile him to a life of perfect ſolitude, ſo we ſhould imagine, that our love of nature and regularity might ſtill remain with us in ſome degree, though we had been born and bred in the Sicilian villa above-mentioned, and never heard any thing applauded but what deſerved cenſure, nor cenſured but what merited applauſe. Yet habit muſt be allowed to have a powerful influence over the

8
Habit has great influence over ſentiment and feeling, and of courſe upon poetry.

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* Brydone's Tour in Sicily, let. 24.

the sentiments and feelings of mankind; for objects to which we have been long accustomed, we are apt to contract a fondness; we conceive them readily, and contemplate them with pleasure; nor do we quit our old habits of speculation or practice without reluctance and pain. Hence in part arises our attachment to our own professions, our old acquaintance, our native soil, our homes, and to the very hills, streams, and rocks in our neighbourhood. It would therefore be strange, if man, accustomed as he is from his earliest days to the regularity of nature, did not contract a liking to her productions and principles of operation.

9 Not necessary [illegible] nature.

Yet we neither expect nor desire, that every human invention, where the end is only to please, should be an exact transcript of real existence. It is enough, that the mind acquiesce in it as probable or plausible, or such as we think might happen without any direct opposition to the laws of nature.—Or, to speak more accurately, it is enough that it be consistent, either, first, with general experience; or, secondly, with popular opinion; or, thirdly, that it be consistent with itself, and connected with probable circumstances.

First: If a human invention be conformable to general experience, we acquiesce in it as sufficiently probable. *Particular* experiences, however, there may be, so uncommon, and so little expected, that we should not admit their probability, if we did not know them to be true. No man of sense believes, that he has any likelihood of being enriched by the discovery of hidden treasure; or thinks it probable, on purchasing a lottery-ticket, that he shall gain the first prize: and yet great wealth has actually been acquired by both good fortunes. But we should look upon these as poor expedients in a play or romance for bringing about a happy catastrophe. We expect that fiction should be more conformable to the general tenor of human affairs: in a word, that not possibility, but probability, should be the standard of poetical invention.

10 [illegible] conformable to nature when it accords with received opinions,

Secondly, Fiction is admitted as conformable to this standard, when it accords with received opinions. These may be erroneous, but are not often *apparently* repugnant to natnre. On this account, and because they are familiar to us from our infancy, the mind readily acquiesces in them, or at least yields them that degree of credit which is necessary to render them pleasing: hence the fairies, ghosts, and witches of Shakespeare, are admitted as probable beings; and angels obtain a place in religious pictures though we know that they do not now appear in the scenery of real life. A poet who should at this day make the whole action of his tragedy depend upon enchantment, and produce the chief events by the assistance of supernatural agents, would indeed be censured as transgressing the bounds of probability, be banished from the theatre to the nursery, and condemned to write fairy tales instead of tragedies. But Shakespeare was in no danger of such censure: In his days the doctrine of witchcraft was established both by law and by the fashion; and it was not only unpolite, but criminal, to doubt it. Nor indeed is it now rejected only by the vulgar: but it does not therefore follow, that a tragedy built upon it should not be acceptable to the learned themselves. When a popular opinion has long been exploded, and has become repugnant to general belief, the fictions built upon it may still be admitted, both because we remember to have admitted them in childhood with some degree of credit, and because we know that they were accounted natural by the people to whom they were first addressed; whose sentiments and views of things we are willing to adopt, when, by the power of pleasing description, we are transported into their times, and made acquainted with their manners. Hence we admit the theology of the ancient poets, their Elysium and Tartarus, Scylla and Charybdis, Cyclops and Circe, and the rest of those "beautiful wonders" of Homer, which were believed in the heroic ages; as well as the demons and enchantments of Tasso, which may be supposed to have obtained some degree of credit among the Italians of the 16th century, and are suitable enough to the notions that prevailed universally in Europe not long before (A). In fact, when poetry is in other respects true, when it gives an accurate display of those parts of nature about which we know that men in all ages must have entertained the same opinion, namely, those appearances in the visible creation, and those feelings and workings of the human mind, which are obvious to all mankind,—when poetry is thus far according to nature, we are very willing to be indulgent to what is fictitious in it, and to grant a temporary allowance to any system of fable which the author pleases to adopt; provided that he lay the scene in a distant country, or fix the date to a remote period. This is no unreasonable piece of complaisance: we owe it both to the poet and to ourselves; for without it we should neither form a right estimate of his genius, nor receive from his works that pleasure which they were intended to impart. Let him, however, take care, that his system of fable be such as his countrymen and cotemporaries (to whom his work is immediately addressed) might be supposed capable of yielding their assent to; for otherwise we should not believe him to be in earnest: and let him connect it as much as he can with probable circumstances, and make it appear in a series of events consistent with itself.

For (thirdly) if this be the case, we shall admit his story as probable, or at least as natural, and consequently be interested in it, even though it be not warranted by general experience, and derive but slender authority from popular opinion. Calyban, in the Tempest, would have shocked the mind as an improbability, if we had not been made acquainted with his origin, and seen his character displayed in a series of consistent behaviour. But when we are told that he sprung from a witch and a demon, a connection not contrary to the laws of nature, as they were understood in Shakespeare's time, and find his manners conformable to his descent, we are easily reconciled to the fiction. In the same sense, the Lilliputians

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(A) In the 14th century, the common people of Italy believed that the poet Dante went down to hell; that the *Inferno* was a true account of what he saw there; and that his fallow complexion, and frizzled beard (which seemed by its growth and colour to have been too near the fire), were the consequence of his passing so much of his time in that hot and smoky region. See *Storia della Letteratura del* § 3. C. *Dante*, cap. 4.

11
and is conſiſtent with itſelf.

of Swift may paſs for probable beings; not ſo much becauſe we know that a belief in pigmies was once current in the world (for the true ancient pigmy was at leaſt thrice as tall as thoſe whom Gulliver viſited), but becauſe we find that every circumſtance relating to them accords with itſelf, and with their ſuppoſed character. It is not the ſize of the people only that is diminutive; their country, ſeas, ſhips, and towns, are all in exact proportion; their theological and political principles, their paſſions, manners, cuſtoms, and all the parts of their conduct, betray a levity and littleneſs perfectly ſuitable; and ſo ſimple is the whole narration, and apparently ſo artleſs and ſincere, that we ſhould not much wonder if it had impoſed (as we have been told it has) upon ſome perſons of no contemptible underſtanding. The ſame degree of credit may perhaps for the ſame reaſons be due to his giants. But when he grounds his narrative upon a contradiction to nature; when he preſents us with rational brutes, and irrational men; when he tells us of horſes building houſes for habitation, milking cows for food, riding in carriages, and holding converſations on the laws and politics of Europe; not all his genius (and he there exerts it to the utmoſt) is able to reconcile us to ſo monſtrous a fiction: we may ſmile at ſome of his abſurd exaggerations; we may be pleaſed with the energy of ſtyle, and accuracy of deſcription, in particular places; and a malevolent heart may triumph in the ſatire; but we can never reliſh it as a fable, becauſe it is at once unnatural and ſelf-contradictory. Swift's judgement ſeems to have forſaken him on this occaſion: he wallows in naſtineſs and brutality; and the general run of his ſatire is downright defamation. Lucian's *True Hiſtory*, is a heap of extravagancies put together without order or unity, or any other apparent deſign than to ridicule the language and manner of grave authors. His ravings, which have no better right to the name of *fable*, than a hill of rubbiſh has to that of palace, are deſtitute of every colour of plauſibility. Animal trees, ſhips ſailing in the ſky, armies of monſtrous things travelling between the ſun and moon on a pavement of cobwebs, rival nations of men inhabiting woods and mountains in a whale's belly,—are liker the dreams of a bedlamite than the inventions of a rational being.

Beattie's Eſſays, ut ſupra.

12
A ſtricter probability requiſite in ſome kinds of poetry than in others.

If we were to proſecute this ſubject any farther, it would be proper to remark, that in ſome kinds of poetical invention a ſtricter probability is required than in others:—that, for inſtance, Comedy, whether dramatic or narrative (B), muſt ſeldom deviate from the ordinary courſe of human affairs, becauſe it exhibits the manners of real and even of familiar life:—that the tragic poet, becauſe he imitates characters more exalted, and generally refers to events little known, or long ſince paſt, may be allowed a wider range; but muſt never attempt the marvellous fictions of the epic muſe, becauſe he addreſſes his work, not only to the paſſions and imagination of mankind, but alſo to their eyes and ears, which are not eaſily impoſed on, and refuſe to be gratified with any repreſentation that does not come very near the truth:—that the epic poem may claim ſtill ampler privileges, becauſe its fictions are not ſubject to the ſcrutiny of any outward ſenſe, and becauſe it conveys information in regard both to the higheſt human characters, and the moſt important and wonderful events, and alſo to the affairs of unſeen worlds and ſuperior beings. Nor would it be improper to obſerve, that the ſeveral ſpecies of comic, of tragic, of epic compoſition, are not confined to the ſame degree of probability: for that farce may be allowed to be leſs probable than the regular comedy; the maſque than the regular tragedy; and the mixed epic, ſuch as the Fairy Queen, and Orlando Furioſo, than the pure epopee of Homer, Virgil, and Milton. But this part of the ſubject ſeems not to require further illuſtration. Enough has been ſaid to ſhow, that nothing unnatural can pleaſe; and that therefore poetry, whoſe end is to pleaſe, muſt be *according to nature*.

And if ſo, it muſt be either according to real nature, or according to nature ſomewhat different from the reality.

SECT. III. *Of the Syſtem of Nature exhibited by Poetry.*

13
Hiſtorians embelliſh their works by fiction, and make them

To exhibit *real nature* is the buſineſs of the hiſtorian; who, if he were ſtrictly to confine himſelf to his own ſphere, would never record even the minuteſt circumſtance of any ſpeech, event, or deſcription, which was not warranted by ſufficient authority. It has been the language of critics in every age, that the hiſtorian ought to relate nothing as true which is falſe or dubious, and to conceal nothing material which he knows to be true. But it is to be doubted whether any writer of profane hiſtory has ever been ſo ſcrupulous. Thucydides himſelf, who began his hiſtory when that war began which he records, and who ſet down every event ſoon after it happened, according to the moſt authentic information, ſeems, however, to have indulged his fancy not a little in his harangues and deſcriptions, particularly that of the plague of Athens: and the ſame thing has been practiſed, with greater latitude, by Livy and Tacitus, and more or leſs by all the beſt hiſtorians both ancient and modern. Nor are they to be blamed for it. By theſe improved or invented ſpeeches, and by the heightenings thus given to their deſcriptions, their work becomes more intereſting, and more uſeful; nobody is deceived, and hiſtorical truth is not materially affected. A medium is, however, to be obſerved in this, as in other things. When the hiſtorian lengthens a deſcription into a detail of fictitious events, as Voltaire has done in his account of the battle of Fontenoy, he loſes his credit with us, by raiſing a ſuſpicion that he is more intent upon a pretty ſtory than upon the truth. And we are diſguſted with his inſincerity, when, in defiance even of veriſimilitude, he puts long elaborate orations in the mouth of thoſe, of whom we know, either from the circumſtances that they could not, or from more authentic records that they did not, make any ſuch orations; as Dionyſius of Halicarnaſſus has done in the caſe of Volumnia haranguing her ſon Coriolanus, and Flavius Joſephus in that of Judah addreſſing his brother as viceroy of Egypt. From what theſe hiſtorians relate, one would conjecture

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(B) Fielding's *Tom Jones*, *Amelia*, and *Joſeph Andrews*, are examples of what may be called the *Epic* or *Narrative Comedy*, or more properly perhaps the *Comic Epopee*.

conjecture that the Roman matron had ſtudied at Athens under ſome long-winded rhetorician, and that the Jewiſh patriarch muſt have been one of the moſt flowery orators of antiquity. But the fictitious part of hiſtory, or of ſtory-telling, ought never to take up much room; and muſt be highly blameable when it leads into any miſtake either of facts or of characters.

14
In ſome degree poetical.

Now, why do hiſtorians take the liberty to embelliſh their works in this manner? One reaſon, no doubt, is, that they may diſplay their talents in oratory and narration: but the chief reaſon, as hinted already, is, to render their compoſition more agreeable. It would ſeem, then, that ſomething more pleaſing than real nature, or ſomething which ſhall add to the pleaſing qualities of real nature, may be deviſed by human fancy. And this may certainly be done. And this it is the poet's buſineſs to do. And when this is in any degree done by the hiſtorian, his narrative becomes in that degree poetical.

Beattie's Eſſays, chap. ii.

The poſſibility of thus improving upon nature muſt be obvious to every one. When we look at a landſcape, we can fancy a thouſand additional embelliſhments. Mountains loftier and more pictureſque; rivers more copious, more limpid, and more beautifully winding; ſmoother and wider lawns; valleys more richly diverſified; caverns and rocks more gloomy and more ſtupendous; ruins more majeſtic; buildings more magnificent; oceans more varied with iſlands, more ſplendid with ſhipping, or more agitated by ſtorm, than any we have ever ſeen—it is eaſy for human imagination to conceive. Many things in art and nature exceed expectation; but nothing ſenſible tranſcends or equals the capacity of thought:—a ſtriking evidence of the dignity of the human ſoul! The fineſt woman in the world appears to every eye ſuſceptible of improvement, except perhaps to that of her lover. No wonder, then, if in poetry events can be exhibited more compact, and of more pleaſing variety, than thoſe delineated by the hiſtorian, and ſcenes of inanimate nature more dreadful or more lovely, and human characters more ſublime and more exquiſite, both in good and evil. Yet ſtill let nature ſupply the ground-work and materials, as well as the ſtandard, of poetical fiction. The moſt expert painters uſe a layman, or other viſible figure, to direct their hand and regulate their fancy. Homer himſelf founds his two poems on authentic tradition; and tragic as well epic poets have followed the example. The writers of romance, too, are ambitious to interweave true adventures with their fables; and when it can be conveniently done, to take the outlines of their plan from real life. Thus the tale of Robinſon Cruſoe is founded on an incident that actually befel one Alexander Selkirk, a ſeafaring man, who lived ſeveral years alone in the iſland of Juan Fernandes: Smollet is thought to have given us ſeveral of his own adventures in the hiſtory of Roderic Random; and the chief characters in Tom Jones, Joſeph Andrews, and Pamela, are ſaid to have been copied from real originals. Dramatic comedy, indeed, is for the moſt part purely fictitious: for if it were to exhibit real events as well as preſent manners, it would become too perſonal to be endured by a well-bred audience, and degenerate into downright abuſe; which appears to have been the caſe with the old comedy of the Greeks *. But in general, hints taken from real exiſtence will be found to give no little grace and ſtability to fiction, even in the moſt fanciful poems. Theſe hints, however, may be improved by the poet's imagination, and ſet off with every probable ornament that can be deviſed, conſiſtently with the deſign and genius of the work; or in other words, with the ſympathies that the poet means to awaken in the mind of his reader. For mere poetical ornament, when it fails to intereſt the affections, is not only uſeleſs, but improper; all true poetry being addreſſed to the heart, and intended to give pleaſure by raiſing or ſoothing the paſſions;—the only effectual way of pleaſing a rational and moral creature. And therefore we would take Horace's maxim to be univerſal in poetry:" "*Non ſatis eſt, pulchra eſſe poemata; dulcia ſunto*:" "It is not enough that poems be beautiful; let them alſo be *affecting*:"—For that this is the meaning of the word *dulcia* in this place, is admitted by the beſt interpreters, and is indeed evident from the context †.

15
Poets embelliſh nature itſelf,

16
and deſcribe even things inanimate ſo as to make them affecting.

That the ſentiments and feelings of percipient beings when expreſſed in poetry, ſhould call forth our affections, is natural enough; but can deſcriptions of inanimate things alſo be made affecting? certainly they can: and the more they affect, the more they pleaſe us, and the more poetical we allow them to be. Virgil's Georgic is a noble ſpecimen (and indeed the nobleſt in the world) of this ſort of poetry. His admiration of external nature gains upon a reader of taſte, till it riſe to perfect enthuſiaſm. The following obſervations will perhaps explain this matter.

Every thing in nature is complex in itſelf, and bears innumerable relations to other things; and may therefore be viewed in an endleſs variety of lights, and conſequently deſcribed in an endleſs variety of ways. Some deſcriptions are good, and others bad. An hiſtorical deſcription, that enumerates all the qualities of any object, is certainly good, becauſe it is true; but may be as unaffecting as a logical definition. In poetry, no unaffecting deſcription is good however conformable to truth: for here we expect not a complete enumeration of qualities (the chief end of the art being to pleaſe), but only ſuch an enumeration as may give a lively and intereſting idea. It is not memory, or the knowledge of rules, that can qualify a poet for this ſort of deſcription; but a peculiar livelineſs of fancy and ſenſibility of heart, the nature whereof we may explain by its effects, but we cannot lay down rules for the attainment of it.

17
Every perſon introduced in poetry ſhould ſee things through the medium of his ruling paſſion.

When our mind is occupied by any emotion, we naturally uſe words and meditate on things that are ſuitable to it and tend to encourage it. If a man were to write a letter when he is very angry, there would probably be ſomething of vehemence or bitterneſs in the ſtyle, even though the perſon to whom he wrote were not the object of his anger. The ſame thing holds true of every other ſtrong paſſion or emotion:—while it predominates in the mind, it gives a peculiarity to our thoughts, as well as to our voice, geſture, and countenance: And hence we expect, that every perſon we introduced in poetry ſhould ſee things through the medium of his ruling paſſion, and that his thoughts and language ſhould be tinctured accordingly. A melancholy man walking in a grove, attends to thoſe things that ſuit and encourage his melancholy; the ſighing of the wind in the trees, the murmuring of waters, the darkneſs and ſolitude of the ſhades: A cheerful man in the

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* Compare Hor. lib. i. Sat. 4. verſ. 1—5 with Ar. Poet. verſ. 281.—285.

† Hor. Ar. Poet. verſ. 95.—100.

Of Nature in Poetry

the ſame place, finds many ſubjects of cheerful meditations, in the ſinging of birds, the briſk motions of the babbling ſtream, and the livelineſs and variety of the verdure. Perſons of different characters, contemplating the ſame thing, a Roman triumph, for inſtance, feel different emotions, and turn their view to different objects. One is filled with wonder at ſuch a diſplay of wealth and power; another exults in the idea of conqueſt, and pants for military renown; a third, ſtunned with clamour, and haraſſed with confuſion, wiſhes for ſilence, ſecurity, and ſolitude; one melts with pity to the vanquiſhed, and makes many a ſad reflection upon the inſignificance of worldly grandeur, and the uncertainty of human things; while the buffoon, and perhaps the philoſopher, conſiders the whole as a vain piece of pageantry, which, by its ſolemn procedure, and by the admiration of ſo many people, is only rendered the more ridiculous:—and each of theſe perſons would deſcribe it in a way ſuitable to his own feelings, and tending to raiſe the ſame in others.

Beattie's Eſſay, ubi ſupra.

We ſee in Milton's Allegro and Penſoroſo, how a different caſt of mind produces a variety in the manner of conceiving and contemplating the ſame rural ſcenery. In the former of theſe excellent poems, the author perſonates a cheerful man, and takes notice of thoſe things in external nature that are ſuitable to cheerful thoughts, and tend to encourage them: in the latter, every object deſcribed is ſerious and ſolemn, and productive of calm reflection and tender melancholy; and we ſhould not be eaſily perſuaded, that Milton wrote the firſt under the influence of ſorrow, or the ſecond under that of gladneſs. We often ſee an author's character in his works; and if every author were in earneſt when he writes, we ſhould oftener ſee it. Thomſon was a man of piety and benevolence, and a warm admirer of the beauties of nature; and every deſcription in his delightful poem on the Seaſons tends to raiſe the ſame laudable affections in his reader. The parts of nature that attract his notice are thoſe which an impious or hard-hearted man would neither attend to, nor be affected with, at leaſt in the ſame manner. In Swift we ſee a turn of mind very different from that of the amiable Thomſon; little reliſh for the ſublime or beautiful, and a perpetual ſucceſſion of violent emotions. All his pictures of human life ſeem to ſhow, that deformity and meanneſs were the favourite objects of his attention, and that his ſoul was a conſtant prey to indignation (c), diſguſt, and other gloomy paſſions, ariſing from ſuch a view of things. And it is the tendency of almoſt all his writings (though it was not always the author's deſign), to communicate the ſame paſſions to his reader: inſomuch, that notwithſtanding his erudition and knowledge of the world, his abilities as a popular orator and man of buſineſs, the energy of his ſtyle, the elegance of ſome of his verſes, and his extraordinary talents in wit and humour, there is reaſon to doubt, whether by ſtudying his works any perſon was very much improved in piety or benevolence.

And thus we ſee, how the compoſitions of an ingenious author may operate upon the heart, whatever be the ſubject. The affections that prevail in the author himſelf, direct his attention to objects congenial, and give a peculiar bias to his inventive powers, and a peculiar colour to his language. Hence his work, as well as face, if nature is permitted to exert herſelf freely in it, will exhibit a picture of his mind, and awaken correſpondent ſympathies in the reader. When theſe are favourable to virtue, which they always ought to be, the work will have that ſweet pathos to which Horace alludes in the paſſage above mentioned; and which we ſo highly admire, and ſo warmly approve, even in thoſe parts of the Georgic that deſcribe inanimate nature.

18
It is thus that poetry affects the heart whatever be its ſubject.

Horace's account of the matter in queſtion differs not from what is here given. "It is not enough (ſays he *) that poems be beautiful; let them be affecting, and agitate the mind with whatever paſſions the poet wiſhes to impart. The human countenance, as it ſmiles on thoſe who ſmile, accompanies alſo with ſympathetic tears thoſe who mourn. If you would have me weep, you muſt firſt weep yourſelf; then, and not before, ſhall I be touched with your misfortunes.—For nature firſt makes the emotions of our mind correſpond with our circumſtances, infuſing real joy, ſorrow, or reſentment, according to the occaſion; and afterwards gives the true pathetic utterance to the voice and language." This doctrine, which concerns the orator and the player no leſs than the poet, is ſtrictly philoſophical, and equally applicable to dramatic, to deſcriptive, and indeed to every ſpecies of intereſting poetry. The poet's ſenſibility muſt firſt of all engage him warmly in his ſubject, and in every part of it; otherwiſe he will labour in vain to intereſt the reader. If he would paint external nature, as Virgil and Thomſon have done, ſo as to make her amiable to others, he muſt firſt be enamoured of her himſelf; if he would have his heroes and heroines ſpeak the language of love or ſorrow, devotion or courage, ambition or anger, benevolence or pity, his heart muſt be ſuſceptible of thoſe emotions, and in ſome degree feel them, as long at leaſt as he employs himſelf in framing words for them; being aſſured, that

* *Ar. Poet.* v. 99.—112

He beſt ſhall paint them who can feel them moſt.
POPE's *Eloiſa*, v. 366.

19
The true poet muſt poſſeſs fancy to invent decorations to nature.

The true poet, therefore, muſt not only ſtudy nature, and know the reality of things, but muſt alſo poſſeſs fancy, to invent additional decorations; judgment, to direct him in the choice of ſuch as accord with veriſimilitude; and ſenſibility, to enter with ardent emotions into every part of his ſubject, ſo as to transfuſe into every part of his work a pathos and energy ſufficient to raiſe correſponding emotions in the reader.

"The hiſtorian and the poet (ſays Ariſtotle *) differ in this, that the former exhibits things as they are, the latter as they might be;"—*i. e.* in that ſtate of perfection which is conſiſtent with probability, and in which, for the ſake of our own gratification, we wiſh to find them. If the poet, after all the liberties he is allowed to take with the truth, can produce nothing more exquiſite than is commonly to be met with in hiſtory, his reader

* *Poetic.* ſect. 9.

(c) For part of this remark we have his own authority, often in his letters, and very explicitly in the Latin epitaph which he compoſed for himſelf:—" ubi ſæva indignatio ulterius cor lacerare nequit." *See his laſt will and teſtament.*

reader will be diſappointed and diſſatisfied. Poetical repreſentations muſt therefore be framed after a pattern of the higheſt probable perfection that the genius of the work will admit:—external nature muſt in them be more pictureſque than in reality; action more animated; ſentiments more expreſſive of the feelings and character, and more ſuitable to the circumſtances of the ſpeaker; perſonages better accompliſhed in thoſe qualities that raiſe admiration, pity, terror, and other ardent emotions; and events more compact, more clearly connected with cauſes and conſequences, and unfolded in an order more flattering to the fancy, and more intereſting to the paſſions. But where, it may be ſaid, is this pattern of perfection to be found? Not in real nature; otherwiſe hiſtory, which delineates real nature, would alſo delineate this pattern of perfection. It is to be found only in the mind of the poet; and it is imagination, regulated by knowledge, that enables him to form it.

In the beginning of life, and while experience is confined to a ſmall circle, we admire every thing, and are pleaſed with very moderate excellence. A peaſant thinks the hall of his landlord the fineſt apartment in the univerſe, liſtens with rapture to the ſtrolling ballad-ſinger, and wonders at the rude wooden cuts that adorn his ruder compoſitions. A child looks upon his native village as a town; upon the brook that runs by as a river; and upon the meadows and hills in the neighbourhood as the moſt ſpacious and beautiful that can be. But when, after long abſence, he returns in his declining years, to viſit, once before he die, the dear ſpot that gave him birth, and thoſe ſcenes whereof he remembers rather the original charms than the exact proportions; how is he diſappointed to find every thing ſo debaſed and ſo diminiſhed! The hills ſeem to have ſunk into the ground, the brook to be dried up, and the village to be forſaken of its people; the pariſh-church, ſtripped of all its fancied magnificence, is become low, gloomy, and narrow; and the fields are now only the miniature of what they were. Had he never left this ſpot, his notions might have remained the ſame as at firſt; and had he travelled but a little way from it, they would not perhaps have received any material enlargement.

20
Obſervation of many things of the ſame kind a great help to poetical fancy, becauſe

It ſeems then to be from obſervation of many things of the ſame or ſimilar kinds, that we acquire the talent of forming ideas more perfect than the real objects that lie immediately around us: and theſe ideas we may improve gradually more and more, according to the vivacity of our mind, and extent of our experience, till at laſt we come to raiſe them to a degree of perfection ſuperior to any thing to be found in real life. There cannot ſure be any myſtery in this doctrine; for we think and ſpeak to the ſame purpoſe every day. Thus nothing is more common than to ſay, that ſuch an artiſt excels all we have ever known in his profeſſion, and yet that we can ſtill conceive a ſuperior performance. A moraliſt, by bringing together into one view the ſeparate virtues of many perſons, is enabled to lay down a ſyſtem of duty more perfect than any he has ever ſeen exemplified in human conduct. Whatever be the emotion the poet intends to raiſe in his reader, whether admiration or terror, joy or ſorrow; and whatever be the object he would exhibit, whether Venus or Tiſiphone, Achilles or Therſites, a palace or a pile of ruins, a dance or a battle; he generally copies an idea of his own imagination; conſidering each quality as it is found to exiſt in ſeveral individuals of a ſpecies, and thence forming an aſſemblage more or leſs perfect in its kind, according to the purpoſe to which he means to apply it.

21
Poetical conceptions muſt be general,

Hence it would appear, that the ideas of poetry are rather general than ſingular; rather collected from the examination of a ſpecies or claſs of things, than copied from an individual. And this, according to Ariſtotle, is in fact the caſe, at leaſt for the moſt part; whence that critic determines, that poetry is ſomething more exquiſite and more philoſophical than hiſtory*. The hiſtorian may deſcribe Bucephalus, but the poet delineates a war-horſe; the former muſt have ſeen the animal he ſpeaks of, or received authentic information concerning it, if he mean to deſcribe it hiſtorically; for the latter, it is enough that he has ſeen ſeveral animals of that ſort. The former tells us, what Achilles actually did and ſaid; the latter, what ſuch a ſpecies of human character as that which bears the name of Achilles would probably do or ſay in certain given circumſtances.

It is indeed true, that the poet may, and often does, copy after individual objects. Homer, no doubt, took his characters from the life; or at leaſt, in forming them, was careful to follow tradition as far as the nature of his plan would allow. But he probably took the freedom to add or heighten ſome qualities, and take away others; to make Achilles, for example, ſtronger, perhaps, and more impetuous, and more eminent for filial affection, and Hector more patriotic and more amiable than he really was. If he had not done this, or ſomething like it, his work would have been rather a hiſtory than a poem; would have exhibited men and things as they were, and not as they might have been; and *Achilles* and *Hector* would have been the names of individual and real heroes; whereas, according to Ariſtotle, they are rather to be conſidered as two diſtinct modifications or ſpecies of the heroic character. Shakeſpeare's account of the cliffs of Dover comes ſo near the truth, that we cannot doubt of its having been written by one who had ſeen them: but he who takes it for an exact hiſtorical deſcription, will be ſurpriſed when he comes to the place, and finds thoſe cliffs not half ſo lofty as the poet had made him believe. An hiſtorian would be to blame for ſuch amplification; becauſe, being to deſcribe an individual precipice, he ought to tell us juſt what it is; which if he did, the deſcription would ſuit that place, and perhaps no other in the whole world. But the poet means only to give an idea of what ſuch a precipice may be; and therefore his deſcription may perhaps be equally applicable to many ſuch chalky precipices on the ſea-ſhore.

This method of copying after general ideas formed by the artiſt from obſervation of many individuals, diſtinguiſhes the Italian and all the ſublime painters, from the Dutch and their imitators. Theſe give us bare nature, with the imperfections and peculiarities of individual things or perſons; but thoſe give nature improved as far as probability and the deſign of the piece will admit. Teniers and Hogarth draw faces, and figures, and dreſſes, from real life, and preſent manners; and therefore their pieces muſt in ſome degree loſe the effect, and become aukward, when the preſent faſhions become obſolete.——Raphael and Reynolds take their models from general nature; avoiding, as far as poſſible, (at leaſt in all their great performances), thoſe peculiarities that derive their beauty from mere faſhion; and therefore their works muſt give pleaſure, and appear elegant, as long as men are capable of forming general ideas, and of judging from them. The laſt mentioned incomparable artiſt is particularly fond of the company of children. Their looks and attitudes, being leſs under the control of art and local manners, are more characteriſtical of the ſpecies than thoſe of men and women. This field of obſervation has ſupplied him with many fine figures, particularly that moſt exquiſite one of Comedy, ſtruggling for and winning (for who could reſiſt her?) the affections of Garrick:—a figure which could never have occurred to the imagination of a painter who had confined his views to grown perſons looking and moving in all the formality of polite life;—a figure which in all ages and countries would be pronounced natural and engaging:—whereas thoſe human forms that we ſee every day bowing and courteſying, and ſtrutting, and turning out their toes *ſecundum artem*, and dreſſed in ruffles, and wigs, and flounces, and hoop-petticoats, and full-trimmed ſuits, would appear elegant no further than the preſent faſhions are propagated, and no longer than they remain unaltered.

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* Poetic. § 9.

22
In order to pleaſe all ages and countries

23
The period in the progreſs of human ſociety to which epic and tragic poets ſhould attend.

There is, in the progreſs of human ſociety, as well as of human life, a period to which it is of great importance for the higher order of poets to attend, and from which they will do well to take their characters, and manners, and the era of their events; namely, that in which men are raiſed above ſavage life, and conſiderably improved by arts, government, and converſation; but not advanced ſo high in the aſcent towards politeneſs, as to have acquired a habit of diſguiſing their thoughts and paſſions, and of reducing their behaviour to the uniformity of the mode. Such was the period which Homer had the good fortune (as a poet) to live in, and to celebrate. This is the period at which the manners of men are moſt picturesque, and their adventures moſt romantic. This is the period when the appetites unperverted by luxury, the powers unenervated by effeminacy, and the thoughts diſengaged from artificial reſtraint, will, in perſons of ſimilar diſpoſitions and circumſtances, operate in nearly the ſame way; and when, conſequently, the characters of particular men will approach to the nature of poetical or general ideas, and, if well imitated, give pleaſure to the whole, or at leaſt to a great majority of mankind. But a character tinctured with the faſhions of polite life would not be ſo generally intereſting. Like a human figure adjuſted by a modern dancing maſter, and dreſſed by a modern tailor, it may have a good effect in ſatire, comedy, or farce: but if introduced into the higher poetry, it would be admired by thoſe only who had learned to admire nothing but preſent faſhions, and by them no longer than the preſent faſhions laſted; and to all the reſt of the world would appear aukward, unaffecting, and perhaps ridiculous. But Achilles and Sarpedon, Diomede and Hector, Neſtor and Ulyſſes, as drawn by Homer, muſt in all ages, independently on faſhion, command the attention and admiration of mankind. Theſe have the qualities that are univerſally known to belong to human nature; whereas the modern fine gentleman is diſtinguiſhed by qualities that belong only to a particular age, ſociety, and corner of the world. We ſpeak not of moral or intellectual virtues, which are objects of admiration to every age; but of thoſe outward accompliſhments, and that particular temperature of the paſſions, which form the moſt perceptible part of a human character.——As, therefore, the politician, in diſcuſſing the rights of mankind, muſt often allude to an imaginary ſtate of nature; ſo the poet who intends to raiſe admiration, pity, terror, and other important emotions, in the generality of mankind, eſpecially in thoſe readers whoſe minds are not improved, muſt take his pictures of life and manners, rather from the heroic period we now ſpeak of, than from the ages of refinement; and muſt therefore (to repeat the maxim of Ariſtotle) "exhibit things, not as they are, but as they might be."

Sect. IV. *Of Poetical Characters.*

24
Requiſites to the delineation of poetical characters.

Horace ſeems to think, that a competent knowledge of moral philoſophy will fit an author for aſſigning the ſuitable qualities and duties to each poetical perſonage: (*Art. Poet.* v. 309.—316.) The maxim may be true, as far as mere morality is the aim of the poet; but cannot be underſtood to refer to the delineation of poetical characters in general: for a thorough acquaintance with all the moral philoſophy in the world would not have enabled Blackmore to paint ſuch a perſonage as Homer's Achilles, Shakeſpeare's Othello, or the Satan of Paradiſe Loſt. To a competency of moral ſcience, there muſt be added an extenſive knowledge of mankind, a warm and elevated imagination, and the greateſt ſenſibility of heart, before a genius can be formed equal to ſo difficult a taſk. Horace is indeed ſo ſenſible of the danger of introducing a new character in poetry, that he even diſcourages the attempt, and adviſes the poet rather to take his perſons from the ancient authors, or from tradition: *Ibid.* v. 119.—130.

To conceive the idea of a good man, and to invent and ſupport a great poetical character, are two very different things, however they may ſeem to have been confounded by ſome late critics. The firſt is eaſy to any perſon ſufficiently inſtructed in the duties of life: the laſt is perhaps of all the efforts of human genius the moſt difficult; ſo very difficult, that, though attempted by many, Homer, Shakeſpeare, and Milton, are almoſt the only authors who have ſucceeded in it. But characters of perfect virtue are not the moſt proper for poetry. It ſeems to be agreed, that the Deity ſhould not be introduced in the machinery of a poetical fable. To aſcribe to him words and actions of our own invention, ſeems very unbecoming; nor can a poetical deſcription, that is known to be, and muſt of neceſſity be, infinitely inadequate, ever ſatisfy the human mind. Poetry, according to the beſt critics, is an imitation of human action; and therefore poetical characters, though elevated, ſhould ſtill partake of the paſſions and frailties of humanity. If it were not for the vices of ſome principal perſonages, the Iliad would not be either ſo intereſting or ſo moral: the moſt moving and moſt eventful parts of the Æneid are thoſe that deſcribe the effects of unlawful paſſion:—the moſt inſtructive tragedy in the world, we mean Macbeth, is founded in crimes of dreadful enormity:—and if Milton had not taken into his plan the fall of our firſt parents, as well as their ſtate of innocence, his

25
Which, though elevated ſhould partake of the frailties of humanity;

his divine poem muſt have wanted much of its pathos, and could not have been (what it now is) ſuch a treaſure of important knowledge, as no other uninſpired writer ever comprehended in ſo ſmall a compaſs.—— Virtue, like truth, is uniform and unchangeable. We may anticipate the part a good man will act in any given circumſtances: and therefore the events that depend on ſuch a man muſt be leſs ſurpriſing than thoſe which proceed from paſſion; the viciſſitudes whereof it is frequently impoſſible to foreſee. From the violent temper of Achilles, in the Iliad, ſpring many great incidents; which could not have taken place, if he had been calm and prudent like Ulyſſes, or pious and patriotic like Eneas: his rejection of Agamemnon's offers, in the ninth book, ariſes from the violence of his reſentment;—his yielding to the requeſt of Patroclus, in the 16th, from the violence of his friendſhip (if we may ſo ſpeak) counteracting his reſentment; and his reſtoring to Priam the dead body of Hector, in the 24th, from the violence of his affection to his own aged father, and his regard to the command of Jupiter, counteracting, in ſome meaſure, both his ſorrow for his friend, and his thirſt for vengeance.——Beſides, except where there is ſome degree of vice, it pains us too exquiſitely to ſee misfortune; and therefore poetry would ceaſe to have a pleaſurable influence over our tender paſſions, if it were to exhibit virtuous characters only. And as in life, evil is neceſſary to our moral probation, and the poſſibility of error to our intellectual improvement: ſo bad or mixed characters are uſeful in poetry, to give to the good ſuch oppoſition, as puts them upon diſplaying and exerciſing their virtue.

26
Why the perſonages in whoſe fate the poet means that we ſhould be intereſted ought to have good and great qualities.

All thoſe perſonages, however, in whoſe fortune the poet means that we ſhould be intereſted, muſt have agreeable and admirable qualities to recommend them to our regard. And perhaps the greateſt difficulty in the art lies in ſuitably blending thoſe faults which the poet finds it expedient to give to any particular hero, with ſuch moral, intellectual, or corporeal accompliſhments, as may engage our eſteem, pity, or admiration, without weakening our hatred of vice, or love of virtue. In moſt of our novels, and in many of our plays, it happens unluckily, that the hero of the piece is ſo captivating, as to incline us to be indulgent to every part of his character, the bad as well as the good. But a great maſter knows how to give the proper direction to human ſenſibility; and, without any perverſion of our faculties, or any confuſion of right and wrong, to make the ſame perſon the object of very different emotions, of pity and hatred, of admiration and horror. Who does not eſteem and admire Macbeth for his courage and generoſity? who does not pity him when beſet with all the terrors of a pregnant imagination, ſuperſtitious temper, and awakened conſcience? who does not abhor him as a monſter of cruelty, treachery, and ingratitude? His good qualities, by drawing us near to him, make us, as it were, eye-witneſſes of his crimes, and give us a fellow feeling of his remorſe; and therefore, his example cannot fail to have a powerful effect in cheriſhing our love of virtue, and fortifying our minds againſt criminal impreſſions; whereas, had he wanted theſe good qualities, we ſhould have kept aloof from his concerns, or viewed them with a ſuperficial attention; in which caſe his example would have had little more weight than that of the robber, of whom we know nothing, but that he was tried, condemned, and executed.—Satan, in Paradiſe Loſt, is a character drawn and ſupported with the moſt conſummate judgement. The old furies and demons, Hecate, Tiſiphone, Alecto, Megara, are objects of unmixed and unmitigated abhorrence; Tityus, Enceladus, and their brethren, are remarkable for nothing but impiety, deformity, and vaſtneſs of ſize; Pluto is, at beſt, an inſipid perſonage; Mars, a hair-brained ruffian; Taſſo's infernal tyrant, an ugly and overgrown monſter:—but in the Miltonic Satan, we are forced to admire the majeſty of the ruined archangel, at the ſame time that we deteſt the unconquerable depravity of the fiend. "But, of all poetical characters, (ſays the elegant critic from whom we are extracting), the Achilles of Homer (D) ſeems to me the moſt exquiſite of invention, and the moſt highly finiſhed. The utility of this character in a moral view is obvious; for it may be conſidered as the ſource of all the morality of the Iliad. Had not the generous and violent temper of Achilles determined him to patronize the augur Calchas in defiance of Agamemnon, and afterwards, on being affronted by that vindictive commander, to abandon for a time the common cauſe of Greece;—the fatal effects of diſſenſion among confederates, and of capricious and tyrannical behaviour in a ſovereign, would not have been the leading moral of Homer's poetry; nor could Hector, Sarpedon, Eneas, Ulyſſes, and the other amiable heroes, have been brought forward to ſignalize their virtues, and to recommend themſelves to the eſteem and imitation of mankind.

Beattie's Eſſays.

27
The excellence of the poetical character of Achilles and

"They who form their judgement of Achilles from the imperfect ſketch given of him by Horace in the *Art of Poetry*, (v. 121, 122.); and conſider him only as a hateful compoſition of anger, revenge, fierceneſs, obſtinacy and pride, can never enter into the views of Homer, nor be ſuitably affected with his narration. All theſe vices are no doubt, in ſome degree, combined in Achilles; but they are tempered with qualities of a different ſort, which render him a moſt intereſting character, and of courſe make the Iliad a moſt intereſting poem. Every reader abhors the faults of this hero: and yet, to an attentive reader of Homer, this hero muſt be the object of eſteem, admiration, and pity: for he has many good as well as bad affections, and is equally

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(D) "I ſay the *Achilles of HOMER*. Later authors have degraded the character of this hero, by ſuppoſing every part of his body invulnerable except the heel. I know not how often I have heard this urged as one of Homer's abſurdities; and indeed the whole Iliad is one continued abſurdity, on this ſuppoſition. But Homer all along makes his hero equally liable to wounds and death with other men. Nay, to prevent all miſtakes in regard to this matter, (if thoſe who cavil at the poet would but read his work), he actually wounds him in the right arm by the lance of Aſteropæus, in the battle near the river Scamander." See *Iliad*, xxi. verſe 161—168.

violent in all:—Nor is he poſſeſſed of a ſingle vice or virtue, which the wonderful art of the poet has not made ſubſervient to the deſign of the poem, and to the progreſs and cataſtrophe of the action; ſo that the hero of the Iliad, conſidered as a poetical perſonage, is juſt what he ſhould be, neither greater nor leſs, neither worſe nor better.—He is everywhere diſtinguiſhed by an abhorrence of oppreſſion, by a liberal and elevated mind, by a paſſion for glory, and by a love of truth, freedom, and ſincerity. He is for the moſt part attentive to the duties of religion; and, except to thoſe who have injured him, courteous and kind: he is affectionate to his tutor Phenix; and not only pities the misfortunes of his enemy Priam, but in the moſt ſoothing manner adminiſters to him the beſt conſolation that Homer's poor theology could furniſh. Though no admirer of the cauſe in which his evil deſtiny compels him to engage, he is warmly attached to his native land; and, ardent as he is in vengeance, he is equally ſo in love to his aged father Peleus, and to his friend Patroclus. He is not luxurious like Paris, or clowniſh like Ajax; his accompliſhments are princely, and his amuſements worthy of a hero. Add to this, as an apology for the vehemence of his anger, that the affront he had received was (according to the manners of that age) of the moſt atrocious nature; and not only unprovoked, but ſuch as, on the part of Agamemnon, betrayed a brutal inſenſibility to merit, as well as a proud, ſelfiſh, ungrateful, and tyrannical diſpoſition. And though he is often inexcuſably furious; yet it is but juſtice to remark, that he was not naturally cruel (E); and that his wildeſt outrages were ſuch as in thoſe rude times might be expected from a violent man of invincible ſtrength and valour, when exaſperated by injury, and frantic with ſorrow.—Our hero's claim to the admiration of mankind is indiſputable. Every part of his character is ſublime and aſtoniſhing. In his perſon, he is the ſtrongeſt, the ſwifteſt, the moſt beautiful of men:—this laſt circumſtance, however, occurs not to his own obſervation, being too trivial to attract the notice of ſo great a mind. The Fates had put it in his power, either to return home before the end of the war, or to remain at Troy:—if he choſe the former, he would enjoy tranquillity and happineſs in his own country to a good old age; if the latter, he muſt periſh in the bloom of his youth:—his affection to his father and native country, and his hatred to Agamemnon, ſtrongly urged him to the firſt; but a deſire to avenge the death of his friend determines him to accept the laſt, with all its conſequences. This at once diſplays the greatneſs of his fortitude, the warmth of his friendſhip, and the violence of his ſanguinary paſſions: and it is this that ſo often and ſo powerfully recommends him to the pity, as well as admiration, of the attentive reader."

28
Of all Homer's characters.

It is equally a proof of rich invention and exact judgement in Homer, that he mixes ſome good qualities in all his bad characters, and ſome degree of imperfection in almoſt all his good ones.—Agamemnon, notwithſtanding his pride, is an able general, and a valiant man, and highly eſteemed as ſuch by the greater part of the army.—Paris, though effeminate, and vain of his dreſs and perſon, is, however, good-natured, patient of reproof, not deſtitute of courage, and eminently ſkilled in muſic and other fine arts.—Ajax is a huge giant; fearleſs rather from inſenſibility to danger, and confidence in his maſſy arms, than from any nobler principle; boaſtful and rough; regardleſs of the gods, though not downright impious: yet there is in his manner ſomething of frankneſs and blunt ſincerity, which entitle him to a ſhare in our eſteem; and he is ever ready to aſſiſt his countrymen, to whom he renders good ſervice on many a perilous emergency.——The character of Helen, in ſpite of her faults, and of the many calamities whereof ſhe is the guilty cauſe, Homer has found means to recommend to our pity, and almoſt to our love; and this he does, without ſeeking to extenuate the crime of Paris, of which the moſt reſpectable perſonages in the poem are made to ſpeak with becoming abhorrence. She is ſo full of remorſe, ſo ready on every occaſion to condemn her paſt conduct, ſo affectionate to her friends, ſo willing to do juſtice to every body's merit, and withal ſo finely accompliſhed, that ſhe extorts our admiration, as well as that of the Trojan ſenators.——Menelaus, though ſufficiently ſenſible of the injury he had received, is yet a man of moderation, clemency, and good-nature, a valiant ſoldier, and a moſt affectionate brother: but there is a daſh of vanity in his compoſition, and he entertains rather too high an opinion of his own abilities, yet never overlooks nor undervalues the merit of others.—Priam would claim unreſerved eſteem, as well as pity, if it were not for his inexcuſeable weakneſs, in gratifying the humour, and by indulgence abetting the crimes, of the moſt worthleſs of all his children, to the utter ruin of his people, family, and kingdom. Madame Dacier ſuppoſes, that he had loſt his authority, and was obliged to fall in with the politics of the times: but of this there appears no evidence; on the contrary, he and his unworthy favourite Paris ſeem to have been the only perſons of diſtinction in Troy who were averſe to the reſtoring of Helen. Priam's foible (if it can be called by ſo ſoft a name), however faulty, is not uncommon, and has often produced calamity both in private and public life. The Scripture gives a memorable inſtance in the hiſtory of the good old Eli.——Sarpedon comes nearer a perfect character than any other of Homer's heroes; but the part he has to act is ſhort. It is a character which one could hardly have expected in thoſe rude times: a ſovereign prince, who conſiders himſelf as a magiſtrate ſet up by the people for the public good, and therefore bound in honour and gratitude to be himſelf their example, and ſtudy to excel as much in virtue as in rank and authority.——Hector is the favourite of every reader, and with good reaſon. To the trueſt valour he joins the moſt generous patriotiſm. He abominates the crime of Paris: but not being able to prevent the war, he thinks it his duty to defend his country, and his father and ſovereign, to the laſt. He too, as well as Achilles, foreſees his

Beattie, ut ſupra.

(E) See *Iliad* xxi. 100. and xxiv. 485—673.—In the firſt of theſe paſſages, Achilles himſelf declares, that before Patroclus was ſlain, he often ſpared the lives of his enemies, and took pleaſure in doing it. It is ſtrange, as Dr Beattie obſerves, that this ſhould be left out in Pope's Tranſlation.

his own death; which heightens our compaſſion, and raiſes our idea of his magnanimity. In all the relations of private life, as a ſon, a father, a huſband, a brother, he is amiable in the higheſt degree; and he is diſtinguiſhed among all the heroes for tenderneſs of affection, gentleneſs of manners, and a pious regard to the duties of religion. One circumſtance of his character, ſtrongly expreſſive of a great and delicate mind, we learn from Helen's lamentation over his dead body, that he was almoſt the only perſon in Troy who had always treated her with kindneſs, and never uttered one reproachful word to give her pain, nor heard others reproach her without blaming them for it. Some tendency to oſtentation (which, however, may be pardonable in a commander in chief), and temporary fits of timidity, are the only blemiſhes diſcoverable in this hero; whoſe portrait Homer appears to have drawn with an affectionate and peculiar attention.

By aſcribing ſo many amiable qualities to Hector and ſome others of the Trojans, the poet intereſts us in the fate of that people, notwithſtanding our being continually kept in mind that they are the injurious party. And by thus blending good and evil, virtue and frailty, in the compoſition of his characters, he makes them the more conformable to the real appearances of human nature, and more uſeful as examples for our improvement; and at the ſame time, without hurting veriſimilitude, gives every neceſſary embelliſhment to particular parts of his poem, and variety, coherence, and animation, to the whole fable. And it may alſo be obſerved, that though ſeveral of his characters are complex, not one of them is made up of incompatible parts: all are natural and probable, and ſuch as we think we have met with, or might have met with, in our intercourſe with mankind.

From the ſame extenſive views of good and evil, in all their forms and combinations, Homer has been enabled to make each of his characters perfectly diſtinct in itſelf, and different from all the reſt; inſomuch, that before we come to the end of the Iliad, we are as well acquainted with his heroes, as with the faces and tempers of our moſt familiar friends. Virgil, by confining himſelf to a few general ideas of fidelity and fortitude, has made his ſubordinate heroes a very good ſort of people; but they are all the ſame, and we have no clear knowledge of any one of them. Achates is faithful, and Gyas is brave, and Cloanthus is brave; and this is all we can ſay of the matter. We ſee theſe heroes at a diſtance, and have ſome notion of their ſhape and ſize; but are not near enough to diſtinguiſh their features; and every face ſeems to exhibit the ſame faint and ambiguous appearance. But of Homer's heroes we know every particular that can be known. We eat, and drink, and talk, and fight, with them: we ſee them in action and out of it; in the field and in their tents and houſes: the very face of the country about Troy we ſeem to be as well acquainted with as if we had been there. Similar characters there are among theſe heroes, as there are ſimilar faces in every ſociety; but we never miſtake one for another. Neſtor and Ulyſſes are both wiſe and both eloquent: but the wiſdom of the former ſeems to be the effect of experience; that of the latter of genius: the eloquence of the one is ſweet and copious, but not always to the purpoſe, and apt to degenerate into ſtory-telling; that of the other is cloſe, emphatical, and perſuaſive, and accompanied with a peculiar modeſty and ſimplicity of manner. Homer's heroes are all valiant; yet each diſplays a modification of valour peculiar to himſelf; one is valiant from principle, another from conſtitution; one is raſh, another cautious; one is impetuous and headſtrong, another impetuous, but tractable; one is cruel, another merciful; one is inſolent and oſtentatious, another gentle and unaſſuming; one is vain of his perſon, another of his ſtrength, and a third of his family.—It would be tedious to give a complete enumeration. Almoſt every ſpecies of the heroic character is to be found in Homer.

29
Virgil fails in drawing characters.

Of the agents in Paradiſe Loſt, it has been obſerved *, that "the weakeſt are the higheſt and nobleſt of human beings, the original parents of mankind; with whoſe actions the elements conſented; on whoſe rectitude or deviation of will depended the ſtate of terreſtrial nature, and the condition of all the future inhabitants of the globe. Of the other agents in the poem, the chief are ſuch as it is irreverence to name on ſlight occaſions: the reſt are lower powers;

> ——Of which the leaſt could wield
> Theſe elements, and arm him with the force
> Of all their regions:

Powers, which only the controul of Omnipotence reſtrains from laying creation waſte, and filling the vaſt expanſe of ſpace with ruin and confuſion. To diſplay the motives and actions of beings thus ſuperior, ſo far as human reaſon can examine, or human imagination repreſent them, is the taſk which Milton undertook and performed. The characters in the Paradiſe Loſt, which admit of examination, are thoſe of angels and of men: of angels good and evil; of man in his innocent and ſinful ſtate.

30
The difficulty of drawing and diſcriminating the characters in Paradiſe Loſt.

"Among the angels, the virtue of Raphael is mild and placid, of eaſy condeſcenſion, and free communication: that of Michael is regal and lofty, attentive to the dignity of his own nature. Abdiel and Gabriel appear occaſionally, and act as every incident requires: the ſolitary fidelity of Abdiel is very amiably painted.

"Of the evil angels, the characters are more diverſified. To Satan ſuch ſentiments are given as ſuit the moſt exalted and moſt depraved being. Milton has been cenſured for the impiety which ſometimes breaks from Satan's mouth; for there are thoughts, it is juſtly remarked, which no obſervation of character can juſtify; becauſe no good man would willingly permit them to paſs, however tranſiently, through his mind. This cenſure has been ſhown to be groundleſs by the great critic from whom we quote. To make Satan ſpeak as a rebel, ſays he, without any ſuch expreſſions as might taint the reader's imagination, was indeed one of the great difficulties in Milton's undertaking; and I cannot but think that he has extricated himſelf with great happineſs. There is in Satan's ſpeeches little that can give pain to a pious ear. The language of rebellion cannot be the ſame with that of obedience: the malignity of Satan foams in haughtineſs and obſtinacy; but his expreſſions are commonly general, and no otherwiſe offenſive than as they are wicked.—The other chiefs of the celeſtial rebellion are very judiciouſly diſcriminated; and the ferocious character of Moloch appears, both in the battle and in the council, with exact conſiſtency.

31
Milton's ſucceſs in this part of his undertaking.

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* Johnſon's Life of Milton.

Of Poetical Arrangement, &c.

"To Adam and to Eve are given, during their innocence, ſuch ſentiments as innocence can generate and utter. Their love is pure benevolence and mutual veneration; their repaſts are without luxury, and their diligence without toil. Their addreſſes to their Maker have little more than the voice of admiration and gratitude: fruition left them nothing to aſk, and innocence left them nothing to fear. But with guilt enter diſtruſt and diſcord, mutual accuſation and ſtubborn ſelf-defence: they regard each other with alienated minds, and dread their Creator as the avenger of their tranſgreſſion; at laſt, they ſeek ſhelter in his mercy, ſoften to repentance, and melt in ſupplication. Both before and after the fall, the different ſentiments ariſing from difference of ſex are traced out with inimitable delicacy and philoſophical propriety. Adam has always that pre-eminence in dignity, and Eve in lovelineſs, which we ſhould naturally look for in the father and mother of mankind."

From what has been ſaid, it ſeems abundantly evident, —That the end of poetry is to pleaſe; and therefore that the moſt perfect poetry muſt be the moſt pleaſing; —that what is unnatural cannot give pleaſure; and therefore that poetry muſt be according to nature:—that it muſt be either according to real nature, or according to nature ſomewhat different from the reality; —that, if according to real nature, it would give no greater pleaſure than hiſtory, which is a tranſcript of real nature;—that greater pleaſure is, however, to be expected from it, becauſe we grant it ſuperior indulgence, in regard to fiction, and the choice of words;—and, conſequently, that poetry muſt be, not according to real nature, but according to nature improved to that degree which is conſiſtent with probability and ſuitable to the poet's purpoſe.——And hence it is that we call poetry, *An imitation of nature*.—For that which is properly termed *imitation* has always in it ſomething which is not in the original. If the prototype and tranſcript be exactly alike; if there be nothing in the one which is not in the other; we may call the latter a *repreſentation*, a *copy*, a *draught*, or a *picture*, of the former; but we never call it an *imitation*.

32
Poetry according to nature improved to that degree which is conſiſtent with probability.

SECT. V. *Of Arrangement, Unity, Digreſſions.—Further remarks on Nature in Poetry.*

33
How a poem ought to begin.

I. THE origin of nations, and the beginnings of great events, are little known, and ſeldom intereſting; whence the firſt part of every hiſtory, compared with the ſequel, is ſomewhat dry and tedious. But a poet muſt, even in the beginning of his work, intereſt the readers, and raiſe high expectation; not by an affected pomp of ſtyle, far leſs by ample promiſes or bold profeſſions; but by ſetting immediately before them ſome incident, ſtriking enough to raiſe curioſity, in regard both to its cauſes and to its conſequences. He muſt therefore take up his ſtory, not at the beginning, but in the middle; or rather, to prevent the work from being too long, as near the end as poſſible; and afterwards take ſome proper opportunity to inform us of the preceding events, in the way of narrative, or by converſation of the perſons introduced, or by ſhort and natural digreſſions.

The action of both the *Iliad* and *Odyſſey* begins about ſix weeks before its concluſion; although the principal events of the war of Troy are to be found in the former; and the adventures of a ten years voyage, followed by the ſuppreſſion of a dangerous domeſtic enemy, in the latter. One of the firſt things mentioned by Homer in the Iliad, is a plague, which Apollo in anger ſent into the Grecian army commanded by Agamemnon and now encamped before Troy. Who this Agamemnon was, and who the Grecians were; for what reaſon they had come hither; how long the ſiege had laſted; what memorable actions had been already performed; and in what condition both parties now were:—all this, and much more, we ſoon learn from occaſional hints and converſations interſperſed through the poem.

In the *Æneid*, which, though it comprehends the tranſactions of ſeven years, opens within a few months of the concluding event, we are firſt preſented with a view of the Trojan fleet at ſea, and no leſs a perſon than Juno intereſting herſelf to raiſe a ſtorm for their deſtruction. This excites a curioſity to know ſomething further: who theſe Trojans were, whence they had come, and whither they were bound; why they had left their own country, and what had befallen them ſince they left it. On all theſe points, the poet, without quitting the track of his narrative, ſoon gives the fulleſt information: The ſtorm riſes; the Trojans are driven to Africa, and hoſpitably received by the queen of the country; at whoſe deſire their commander relates his adventures.

The action of *Paradiſe Loſt* commences not many days before Adam and Eve are expelled from the garden of Eden, which is the concluding event. This poem, as its plan is incomparably more ſublime and more important than that of either the Iliad or Æneid, opens with a far more intereſting ſcene: a multitude of angels and archangels ſhut up in a region of torment and darkneſs, and rolling on a lake of unquenchable fire. Who theſe angels are, and what brought them into this miſerable condition, we naturally wiſh to know; and the poet in due time informs us; partly from the converſation of the fiends themſelves; and more particularly by the mouth of a happy ſpirit, ſent from heaven to caution the father and mother of mankind againſt temptation, and confirm their good reſolutions by unfolding the dreadful effects of impiety and diſobedience.

Beattie, ut ſupra.

34
The advantage of the poetical arrangement.

This poetical arrangement of events, ſo different from the hiſtorical, has other advantages beſides thoſe ariſing from brevity and compactneſs of detail: it is obviouſly more affecting to the fancy, and more alarming to the paſſions; and, being more ſuitable to the order and the manner in which the actions of other men ſtrike our ſenſes, is a more exact imitation of human affairs. I hear a ſudden noiſe in the ſtreet, and run to ſee what is the matter. An inſurrection has happened, a great multitude is brought together, and ſomething very important is going forward. The ſcene before me is the firſt thing that engages my attention; and is in itſelf ſo intereſting, that for a moment or two I look at it in ſilence and wonder. By and by, when I get time for reflection, I begin to inquire into the cauſe of all this tumult, and what it is the people would be at; and one who is better informed than I, explains the affair from the beginning; or perhaps I make this out for myſelf, from the words and actions of the perſons principally concerned. This is a ſort of picture of poetical arrangement, both in epic and dramatic compoſition; and this plan

Of Poetical Arrangement, &c.

plan has been followed in ſome heroic odes and ballads both ancient and modern.—The hiſtorian purſues a different method. He begins perhaps with an account of the manners of a certain age, and of the political conſtitution of a certain country; then introduces a particular perſon, gives the ſtory of his birth, connections, private character, purſuits, [illegible] intereſts, and of the events that promoted his views, and brought him acquainted with other turbulent ſpirits like himſelf; and ſo proceeds, unravelling, according to the order of time, the cauſes, principles, and progreſs of the conſpiracy, if that be the ſubject which he undertakes to illuſtrate. It cannot be denied, that this latter method is more favourable to calm information: but the former, compared with it, will be found to have all the advantages already ſpecified, and to be more effectually productive of that mental pleaſure which depends on the paſſions and imagination.

35 Unity of deſign more neceſſary to the higher poetry.

II. If a work have no determinate end, it has no meaning; and if it have many ends, it will diſtract by its multiplicity. Unity of deſign, therefore, belongs in ſome meaſure to all compoſition, whether in verſe or proſe. But to ſome it is more eſſential than to others; and to none ſo much as in the higher poetry. In certain kinds of hiſtory, there is unity ſufficient if all the events recorded be referred to one perſon; in others, if to one period of time, or to one people, or even to the inhabitants of one and the ſame planet. But it is not enough that the ſubject of a poetical fable be the exploits of one perſon: for theſe may be of various and even of oppoſite ſorts and tendencies, and take up longer time than the nature of poetry can admit:—far leſs can a regular poem comprehend the affairs of one period or of one people:—it muſt be limited to one great action or event, to the illuſtration of which all the ſubordinate events muſt contribute; and theſe muſt be ſo connected with one another, as well as with the poet's general purpoſe, that one cannot be changed, tranſpoſed, or taken away, without affecting the conſiſtence and ſtability of the whole *. In itſelf an incident may be intereſting, a character well drawn, a deſcription beautiful: and yet, if it diſagree with the general plan, or if it obſtruct or encumber the main action, inſtead of helping it forward, a correct artiſt would conſider it but as a gaudy ſuperfluity or ſplendid deformity; like a piece of ſcarlet cloth ſewed upon a garment of a different colour †. Not that all the parts of the fable either are, or can be, equally eſſential. Many deſcriptions and thoughts, of little conſequence to the plan, may be admitted for the ſake of variety; and the poet may, as well as the hiſtorian and philoſopher, drop his ſubject for a time, in order to take up an affecting or inſtructive digreſſion.

* Ariſt. Poet. § 8.

† Hor. Ar. Poet. v. 15. &c.

36 The propriety of digreſſions and epiſodes depends upon

III. The doctrine of poetical digreſſions and epiſodes has been largely treated by the critics. We ſhall here only remark, that, in eſtimating their propriety, three things are to be attended to:—their connection with the fable or ſubject; their own peculiar excellence; and their ſubſerviency to the poet's deſign.

37 Their connection with the ſubject of the poem.

(1.) Thoſe digreſſions that both ariſe from and terminate in the ſubject, like the epiſode of the angel Raphael in Paradiſe Loſt, and the tranſition to the death of Cæſar and the civil wars in the firſt book of the Georgic, are the moſt artful, and if ſuitably executed claim the higheſt praiſe.—Thoſe that ariſe from, but do not terminate in, the ſubject, are perhaps ſecond in the order of merit; like the ſtory of [illegible] in the Æneid, and the encomium on a country life in the ſecond book of the Georgic: the [illegible] next [illegible], and do [illegible] the laſt, of which there are ſeveral in the third book of the Æneid, and in the Odyſſey.—And thoſe that [illegible] the ſubject nor ariſe from it [illegible]; and, if they be long, [illegible] be [illegible].

38 Their own peculiar excellence.

(2.) We are willing to excuſe a beautiful epiſode or digreſſion, however [illegible] the ſubject it may be introduced. [illegible] Virgil for dwelling [illegible] upon them [illegible] the [illegible] of [illegible] and [illegible] Georgic; or Milton for the [illegible] to [illegible] in the beginning of the third book, [illegible] to the period of good poetry, [illegible] one would rather be the author [illegible] the books of [illegible] in the world. Yet ſtill it is better that an epiſode poſſeſs the beauty of connection, together with its own intrinſic elegance, than [illegible] the other.

39 Their ſubſerviency to the poet's deſign.

Moreover, in judging of the propriety of epiſodes and other ſimilar contrivances, it may be expedient to attend (3.) to the deſign of the poet, as diſtinguiſhed from the fable or ſubject of the poem. The great deſign, for example, of Virgil, was to intereſt his countrymen in a poem written with a view to reconcile them to the perſon and government of Auguſtus. Whatever, therefore, in the poem tends to promote this deſign, even though it ſhould in ſome degree hurt the conſiſtence of the fable, is really a proof of the poet's judgement; and may be not only allowed, but applauded.—The progreſs of the action of the Æneid may ſeem to be too long obſtructed in one place by the ſtory of Dido, which, though it riſes from the preceding part of the poem, has no influence upon the ſequel; and, in another, by the epiſode of Cacus, which, without injury to the fable, might have been omitted altogether. Yet theſe epiſodes, intereſting as they are to us and all mankind becauſe of the tranſcendent merit of the poetry, muſt have been ſtill more intereſting to the Romans becauſe of their connection with the Roman affairs: for the one accounts poetically for their wars with Carthage; and the other not only explains ſome of their religious ceremonies, but alſo gives a moſt charming rural picture of thoſe hills and valleys in the neighbourhood of the Tiber, on which, in after times, their majeſtic city was to ſtand.—And if we conſider, that the deſign of Homer's Iliad was not only to ſhow the fatal effects of diſſenſion among confederates, but alſo to immortalize his country, and celebrate the moſt diſtinguiſhed families in it, we ſhall be inclined to think more favourably than critics generally do of ſome of his long ſpeeches and digreſſions; which, though to us they may ſeem trivial, muſt have been very intereſting to his countrymen on account of the genealogies and private hiſtories recorded in them.—Shakeſpeare's hiſtorical plays, conſidered as dramatic fables, and tried by the laws of tragedy and comedy, appear very rude compoſitions; but if we attend to the poet's deſign (as the elegant critic who with equal truth and beauty explains it [illegible]), we ſhall be forced to admire his judgement in the general conduct of theſe pieces, as well as his exquiſite taſte in the execution of particular parts.

There is yet another point of view in which theſe digreſſions may be conſidered. If they tend to illuſtrate any important character, or to introduce any intereſting event not otherwiſe within the compaſs of the poem, or to give an amiable diſplay of any particular virtue, they may be intitled, not to our pardon only, but even to our admiration, however looſely they may hang upon the fable. All theſe three ends are effected by that moſt beautiful epiſode of Hector and Andromache in the ſixth book of the Iliad; and the two laſt, by the no leſs beautiful one of Euryalus and Niſus in the ninth book of the Æneid.

IV. And now, from the poſition formerly eſtabliſhed, that the end of this divine art is to give pleaſure, it has been endeavoured to prove, that, whether in diſplaying the appearances of the material univerſe, or in imitating the workings of the human mind, and the varieties of human character, or in arranging and combining into one whole the ſeveral incidents and parts whereof his fable conſiſts,—the aim of the poet muſt be to copy nature, not as it is, but in that ſtate of perfection in which, conſiſtently with the particular genius of the work, and the laws of veriſimilitude, it may be ſuppoſed to be.

Such, in general, is the nature of that poetry which is intended to raiſe admiration, pity, and other ſerious emotions. But in this art, as in all others, there are different degrees of excellence; and we have hitherto directed our view chiefly to the higheſt. All ſerious poets are not equally ſolicitous to improve nature. Euripides is ſaid to have repreſented men as they were; Sophocles, more poetically, as they ſhould or might be ‖. Theocritus in his Idyls, and Spenſer in his Shepherd's Calendar, give us language and ſentiments more nearly approaching thoſe of the *Rus verum et barbarum* §, than what we meet with in the Paſtorals of Virgil and Pope. In the hiſtorical drama, human characters and events muſt be according to hiſtorical truth, or at leaſt not ſo remote from it as to lead into any important miſapprehenſion of fact. And in the hiſtorical epic poem, ſuch as the Pharſalia of Lucan, and the Campaign of Addiſon, the hiſtorical arrangement is preferred to the poetical, as being nearer the truth. Yet nature is a little improved even in theſe poems. The perſons in Shakeſpeare's hiſtorical plays, and the heroes of the Pharſalia, talk in verſe, and ſuitably to their characters, and with a readineſs, beauty, and harmony of expreſſion, not to be met with in real life, nor even in hiſtory: ſpeeches are invented, and, to heighten the deſcription, circumſtances added, with great latitude: real events are rendered more compact and more ſtrictly dependent upon one another; and fictitious ones brought in, to elucidate human characters and diverſify the narration.

40
Nature always to be improved by the poet, though

The more poetry improves nature, by copying after general ideas collected from extenſive obſervation, the more it partakes (according to Ariſtotle) of the nature of philoſophy; the greater ſtretch of fancy and of obſervation it requires in the artiſt, the better chance it has to be univerſally agreeable.

41
when poetry falls ſhort of this perfection it may have great merit in other reſpects.

Yet poetry, when it falls ſhort of this perfection, may have great merit as an inſtrument of both inſtruction and pleaſure. To moſt men, ſimple unadorned nature is, at certain times, and in certain compoſitions, more agreeable than the moſt elaborate improvements of art; as a plain ſhort period, without modulation, gives a pleaſing variety to a diſcourſe. Many ſuch portraits of ſimple nature there are in the ſubordinate parts both of Homer's and of Virgil's poetry: and an excellent effect they have in giving probability to the fiction, as well as in gratifying the reader's fancy with images diſtinct and lively, and eaſily comprehended. The hiſtorical plays of Shakeſpeare raiſe not our pity and terror to ſuch a height as Lear, Macbeth, or Othello; but they intereſt and inſtruct us greatly notwithſtanding. The rudeſt of the eclogues of Theocritus, or even of Spenſer, have by ſome authors been extolled above thoſe of Virgil, becauſe more like real life. Nay, Corneille is known to have preferred the Pharſalia to the Æneid, perhaps from its being nearer the truth, or perhaps from the ſublime ſentiments of ſtoical morality ſo forcibly and ſo oſtentatiouſly diſplayed in it.

Poets may refine upon nature too much as well as too little; for affectation and ruſticity are equally remote from true elegance. The ſtyle and ſentiments of comedy ſhould no doubt be more correct and more pointed than thoſe of the moſt polite converſation: but to make every footman a wit, and every gentleman and lady an epigrammatiſt, as Congreve has done, is an exceſſive and faulty refinement. The proper medium has been hit by Menander and Terence, by Shakeſpeare in his happier ſcenes, and by Garrick, Cumberland, and ſome others of late renown. To deſcribe the paſſion of love with as little delicacy as ſome men ſpeak of it would be unpardonable; but to transform it into mere Platonic adoration is to run into another extreme, leſs criminal indeed, but too remote from univerſal truth to be univerſally intereſting. To the former extreme Ovid inclines, and Petrarch and his imitators to the latter. Virgil has happily avoided both: but Milton has painted this paſſion as diſtinct from all others, with ſuch peculiar truth and beauty, that we cannot think Voltaire's encomium too high, when he ſays, that love in all other poetry ſeems a weakneſs, but in Paradiſe Loſt a virtue. There are many good ſtrokes of nature in Ramſay's Gentle Shepherd; but the author's paſſion for the *rus verum* betrays him into ſome indelicacies: a cenſure that falls with greater weight upon Theocritus, who is often abſolutely indecent. The Italian paſtoral of Taſſo and Guarini, and the French of Fontenelle, run into the oppoſite extreme (though in ſome parts beautifully ſimple), and diſplay a ſyſtem of rural manners ſo quaint and affected as to outrage all probability. In fine, though mediocrity of execution in poetry be allowed to deſerve the doom pronounced upon it by Horace; yet it is true, notwithſtanding, that in this art, as in many other good things, the point of excellence lies in a middle between two extremes; and has been reached by thoſe only who ſought to improve nature as far as the genius of their work would permit, keeping at an equal diſtance from ruſticity on the one hand, and affected elegance on the other.

SECT. VI. *Of Poetical Language.*

42
Words in poetry to b chosen for their ſenſe and for their ſou

WORDS in poetry are choſen, firſt, for their *ſenſe*; and, ſecondly, for their *ſound*. That the firſt of theſe grounds of choice is the more excellent nobody can deny. He who in literary matters prefers ſound to ſenſe is a fool. Yet ſound is to be attended to even in proſe, and in verſe demands particular attention. We ſhall conſider poetical language, firſt, as SIGNIFICANT; and, ſecondly, as SUSCEPTIBLE OF HARMONY.

‖ Ariſt. Poet.

§ Martial.

§ 1. *Of Poetical Language conſidered as* SIGNIFICANT.

43
The language of poetry an imitation of the language of nature,

If, as it has been endeavoured to prove, poetry be imitative of nature, poetical fictions of real events, poetical images of real appearances in the viſible creation, and poetical perſonages of real human characters; it would ſeem to follow, that the *language of poetry* muſt be an imitation of the *language of nature*.

According to Dr Beattie *, that language is natural which is ſuited to the ſpeaker's condition, character, and circumſtances. And as, for the moſt part, the images and ſentiments of ſerious poetry are copied from the images and ſentiments, not of real, but of improved, nature; ſo the language of ſerious poetry muſt (as hinted already be a tranſcript, not of the real language of nature, which is often diſſonant and rude, but of natural language improved as far as may be conſiſtent with probability, and with the ſuppoſed character of the ſpeaker. If this be not the caſe, if the language of poetry be ſuch only as we hear in converſation or read in hiſtory, it will, inſtead of delight, bring diſappointment: becauſe it will fall ſhort of what we expect from an art which is recommended rather by its pleaſurable qualities than by its intrinſic utility; and to which, in order to render it pleaſing, we grant higher privileges than to any other kind of literary compoſition, or any other mode of human language.

44
improved as far as may be conſiſtent with probability, &c.

The next inquiry muſt therefore be, "What are thoſe improvements that peculiarly belong to the language of poetry?" And theſe may be comprehended under two heads; *poetical words*, and *tropes and figures*.

Art. I. Of Poetical Words.

One mode of improvement peculiar to poetical diction reſults from the uſe of thoſe words and phraſes which, becauſe they rarely occur in proſe, and frequently in verſe, are by the grammarian and lexicographer termed *poetical*. In theſe ſome languages abound more than others; but no language perhaps is altogether without them, and perhaps no language can be ſo in which any number of good poems have been written: for poetry is better remembered than proſe, eſpecially by poetical authors, who will always be apt to imitate the phraſeology of thoſe they have been accuſtomed to read and admire; and thus, in the works of poets down through ſucceſſive generations, certain phraſes may have been conveyed, which, though originally perhaps in common uſe, are now confined to poetical compoſition. Proſe writers are not ſo apt to imitate one another, at leaſt in words and phraſes, both becauſe they do not ſo well remember one another's phraſeology, and alſo becauſe their language is leſs artificial, and muſt not, if they would make it eaſy and flowing (without which it cannot be elegant), depart eſſentially from the ſtyle of correct converſation. Poets, too, on account of the greater difficulty of their numbers, have, both in the choice and in the arrangement of words, a better claim to indulgence, and ſtand more in need of a diſcretionary power.

45
All languages have words peculiar to poetry.

The language of Homer differs materially from what was written and ſpoken in Greece in the days of Socrates. It differs in the mode of inflection, it differs in the ſyntax, it differs even in the words: ſo that one might read Homer with eaſe who could not read Xenophon; or Xenophon, without being able to read Homer. Yet we cannot believe that Homer, or the firſt Greek poet who wrote in his ſtyle, would make choice of a dialect quite different from what was intelligible in his own time: for poets have in all ages written with a view to be read, and to be read with pleaſure; which they could not be if their diction were hard to be underſtood. It is more reaſonable to ſuppoſe that the language of Homer is according to ſome ancient dialect, which, though not perhaps in familiar uſe among the Greeks at the time he wrote, was however intelligible. From the Homeric to the Socratic age, a period had elapſed of no leſs than 400 years; during which the ſtyle both of diſcourſe and of writing muſt have undergone great alterations. Yet the Iliad continued the ſtandard of heroic poetry, and was conſidered as the very perfection of poetical language; notwithſtanding that ſome words in it were become ſo antiquated, or ſo ambiguous, that Ariſtotle himſelf ſeems to have been ſomewhat doubtful in regard to their meaning †. And if Chaucer's merit as a poet had been as great as Homer's, and the Engliſh tongue under Edward III. as perfect as the Greek was in the ſecond century after the Trojan war, the ſtyle of Chaucer would probably have been our model for poetical diction at this day; even as Petrarch, his contemporary, is ſtill imitated by the beſt poets of Italy.

The rudeneſs of the ſtyle of Ennius has been imputed by the old critics to his having copied too cloſely the dialect of common life. But this appears to be a miſtake. For if we compare the fragments of that author with the comedies of Plautus, who flouriſhed in the ſame age, and whoſe language was certainly copied from that of common life, we ſhall be ſtruck with an air of antiquity in the former that is not in the latter. Ennius, no doubt, like moſt other ſublime poets, affected ſomething of the antique in his expreſſion: and many of his words and phraſes, not adopted by any proſe-writer now extant, are to be found in Lucretius and Virgil, and were by them tranſmitted to ſucceeding poets. Theſe form part of the Roman poetical dialect; which appears from the writings of Virgil, where we have it in perfection, to have been very copious. The ſtyle of this charming poet is indeed ſo different from proſe, and is altogether ſo peculiar, that it is perhaps impoſſible to analyſe it on the common principles of Latin grammar. And yet no author can be more perſpicuous or more expreſſive; notwithſtanding the frequency of Greciſm in his ſyntax, and his love of old words, which he, in the judgement of Quintilian, knew better than any other man how to improve into decoration ‖.

46
The poetical dialect different from that of proſe.

The poetical dialect of modern Italy is ſo different from the proſaic, that perſons who can read the hiſtorians, and even ſpeak with tolerable fluency the language of that country, may yet find it difficult to conſtrue a page of Petrarch or Taſſo. Yet it is not probable, that Petrarch, whoſe works are a ſtandard of the Italian poetical diction §, made any material innovations in his native tongue. It is rather probable that he wrote it nearly as it was ſpoken in his time, that is, in the 14th century; omitting only harſh combinations, and taking that liberty which Homer probably, and Virgil certainly, took before him, of reviving ſuch old, but not obſolete expreſſions, as ſeemed peculiarly ſignificant and melodious; and poliſhing his ſtyle to that degree of elegance which human ſpeech, without beco-

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* *Eſſays*, Part ii. chap. 1.

† *Poetic.* cap. 25.

‖ *Inſtit.* viii. 3. § 3.

§ *Vicende della literatura del Denina*, cap. 4.

Of Poetical Words.

ming unnatural, may admit of, and which the genius of poetry, as an art ſubſervient to pleaſure, may be thought to require.

The French poetry in general is diſtinguiſhed from proſe rather by the rhime and the meaſure, than by any old or uncommon phraſeology. Yet the French, on certain ſubjects, imitate the ſtyle of their old poets, of Marot in particular; and may therefore be ſaid to have ſomething of a poetical dialect, though far leſs extenſive than the Italian, or even than the Engliſh. And it may be preſumed, that in future ages they will have more of this dialect than they have at preſent. This may be inferred from the very uncommon merit of ſome of their late poets, particularly Boileau and La Fontaine, who, in their reſpective departments, will continue to be imitated, when the preſent modes of French proſe are greatly changed: an event that, for all the pains they take to preſerve their language, muſt inevitably happen, and whereof there are not wanting ſome preſages already.

The Engliſh poetical dialect is not characteriſed by any peculiarities of inflection, nor by any great latitude in the uſe of foreign idioms. More copious it is, however, than one would at firſt imagine; as may appear from the following ſpecimen and obſervations.

47
Phraſes in Engliſh poetry not uſual in proſe

(1.) A few Greek and Latin idioms are common in Engliſh poetry, which are ſeldom or never to be met with in proſe. QUENCHED OF HOPE. Shakeſpeare.—SHORN OF HIS BEAMS. Milton.—*Created thing* NOR VALUED HE NOR SHUN'D. Milton.—*'Tis thus we riot, while* WHO SOW IT STARVE. Pope.—*This day* BE BREAD AND PEACE MY LOT. Pope.—INTO WHAT PIT THOU SEE'ST FROM WHAT HEIGHT FALLEN. Milton. *He deceived the mother of mankind.* WHAT TIME HIS PRIDE HAD CAST HIM *out of heaven.* Milton.—Some of theſe, with others to be found in Milton, ſeem to have been adopted for the ſake of brevity, which in the poetical tongue is indiſpenſable. For the ſame reaſon, perhaps the articles *a* and *the* are ſometimes omitted by our poets, though leſs frequently in ſerious than burleſque compoſition.——In Engliſh, the adjective generally goes before the ſubſtantive, the nominative before the verb, and the active verb before (what we call) the accuſative. Exceptions, however, to this rule, are not uncommon even in proſe. But in poetry they are more frequent. *Their homely joys, and* DESTINY OBSCURE. *Now fades the glimmering landſcape on the ſight; and all the air a ſolemn ſtillneſs holds.* In general, that verſification may be leſs difficult, and the cadence more uniformly pleaſing; and ſometimes, too, in order to give energy to expreſſion, or vivacity to an image,—the Engliſh poet is permitted to take much greater liberties than the proſe-writer, in arranging his words, and modulating his lines and periods. Examples may be ſeen in every page of Paradiſe Loſt.

(2.) Some of our poetical words take an additional ſyllable, that they may ſuit the verſe the better; as, *diſpart*, *diſtain*, *diſport*, *affright*, *enchain*, for part, ſtain, ſport, fright, chain. Others ſeem to be nothing elſe than common words made ſhorter, for the convenience of the verſifier. Such are, *auxiliar*, *ſublunar*, *trump*, *vale*, *part*, *clime*, *ſubmiſs*, *frolic*, *plain*, *drear*, *dread*, *helm*, *morn*, *mead*, *eve* and *even*, *gan*, *illume* and *illumine*, *ope*, *hoar*, *bide*, *ſwage*, *ſcape*; for auxiliary, ſublunary, trumpet, valley, depart, climate, ſubmiſſive, frolicſome, complain, dreary, dreadful, helmet, morning, meadow, evening, began or began to, illuminate, open, hoary, abide, aſſuage, eſcape.——Of ſome of theſe the ſhort form is the more ancient. In Scotland, *even*, *morn*, *bide*, *ſwage*, are ſtill in vulgar uſe; but *morn*, except when contradiſtinguiſhed to *even*, is ſynonymous, not with *morning* (as in the Engliſh poetical dialect), but with *morrow*. The Latin poets, in a way ſomewhat ſimilar, and perhaps for a ſimilar reaſon, ſhortened *fundamentum*, *tutamentum*, *munimentum*, &c. into fundamen, tutamen, munimen.

(3.) Of the following words, which are now almoſt peculiar to poetry, the greater part are ancient, and were once no doubt in common uſe in England, as many of them ſtill are in Scotland. *Afield*, *amain*, *annoy* (a noun), *anon*, *aye* (ever), *beheſt*, *blithe*, *brand* (ſword), *bridal*, *carol*, *dame* (lady), *featly*, *fell* (an adjective), *gaude*, *gore*, *hoſt* (army), *lambkin*, *late* (of late), *lay* (poem), *lea*, *glade*, *gleam*, *hurl*, *lore*, *meed*, *oriſons*, *plod* (to travel laboriouſly), *ringlet*, *rue* (a verb) *ruth*, *ruthleſs*, *ſojourn* (a noun), *ſmite*, *ſpeed* (an active verb), *ſave* (except), *ſpray* (twig), *ſteed*, *ſtrain* (ſong), *ſtrand*, *ſwain*, *thrall*, *thrill*, *trail* (a verb), *troll*, *wail*, *welter*, *warble*, *wayward*, *woo*, *the while* (in the mean time), *yon*, *of yore*.

(4.) Theſe that follow are alſo poetical; but, ſo far as appears, were never in common uſe. *Appal*, *arrowy*, *attune*, *battailous*, *breezy*, *car* (chariot), *clarion*, *cates*, *courſer*, *darkling*, *flicker*, *floweret*, *emblaze*, *gairiſh*, *circlet*, *impearl*, *nightly*, *noiſeleſs*, *pinion* (wing), *ſhadowy*, *ſlumberous*, *ſtreamy*, *troublous*, *wilder* (a verb), *ſhrill* (a verb), *ſhook* (ſhaken), *madding*, *viewleſs*.—The following, too, derived from the Greek and Latin, ſeem peculiar to poetry. *Clang*, *clangor*, *choral*, *bland*, *boreal*, *dire*, *enſanguined*, *ire*, *ireful*, *lave* (to waſh), *nymph*, (lady, girl), *orient*, *panoply*, *philomel*, *infuriate*, *jocund*, *radiant*, *rapt*, *redolent*, *refulgent*, *verdant*, *vernal*, *zephyr*, *zone* (girdle), *ſylvan*, *ſuffuſe*.

(5.) In moſt languages, the rapidity of pronunciation abbreviates ſome of the commoneſt words, or even joins two, or perhaps more, of them, into one; and ſome of thoſe abbreviated forms find admiſſion into writing. The Engliſh language was quite disfigured by them in the end of the laſt century; but Swift, by his ſatire and example, brought them into diſrepute: and, though ſome of them be retained in converſation, as *don't*, *ſhan't*, *can't*, they are now avoided in ſolemn ſtyle; and by elegant writers in general, except where the colloquial dialect is imitated, as in comedy. *'Tis* and *'twas*, ſince the time of Shafteſbury, ſeem to have been daily loſing credit, at leaſt in proſe; but ſtill have a place in poetry, perhaps becauſe they contribute to conciſeneſs. *'Twas on a lofty vaſe's ſide.* Gray.—*'Tis true, 'tis certain, man, though dead, retains part of himſelf.* Pope. In verſe too, *over* may be ſhortened into *o'er*, (which is the Scotch, and probably was the old Engliſh, pronunciation); *never* into *ne'er*; and from *the* and *to*, when they go before a word beginning with a vowel, the final letter is ſometimes cut off. *O'er hills, o'er dales, o'er crags, o'er rocks they go.* Pope.—*Where'er ſhe turns, the Graces homage pay. And all that beauty, all that wealth e'er gave. Rich with the ſpoils of time did ne'er unroll.* Gray.—*T'alarm th' eternal midnight of the grave.*——Theſe abbreviations are now peculiar to the poetical tongue, but not neceſſary to it. They ſometimes

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ſometimes promote brevity, and render verſification leſs difficult.

(6.) Thoſe words which are commonly called *compound epithets*, as *roſy-finger'd*, *roſy-boſom'd*, *many-twinkling*, *many-ſounding*, *moſs-grown*, *bright-eyed*, *ſtraw-built*, *ſpirit-ſtirring*, *incenſe-breathing*, *heaven-taught*, *love-whiſpering*, *lute-reſounding*, are alſo to be conſidered as part of our poetical dialect. It is true, we have compounded adjectives in familiar uſe, as *high-ſeaſoned*, *well-natured*, *ill-bred*, and innumerable others. But we ſpeak of thoſe that are leſs common, that ſeldom occur except in poetry, and of which in proſe the uſe would appear

43 to be uſed ſparingly;

affected. And that they ſometimes promote brevity and vivacity of expreſſion, cannot be denied. But as they give, when too frequent, a ſtiff and finical air to a performance; as they are not always explicit in the ſenſe, nor agreeable in the ſound; as they are apt to produce a confuſion, or too great a multiplicity, of images; as they tend to disfigure the language, and furniſh a pretext for endleſs innovation; they ought to be uſed ſparingly; and thoſe only uſed which the practice of popular authors has rendered familiar to the ear, and which are in themſelves peculiarly emphatical and harmonious.

(7.) In the transformation of nouns into verbs and participles, our poetical dialect admits of greater latitude than proſe. Hymn, pillow, curtain, ſtory, pillar, picture, peal, ſurge, cavern, honey, career, cincture, boſom, ſphere, are common nouns; but *to hymn*, *to pillow*, *curtained*, *pillared*, *pictured*, *pealing*, *ſurging*, *cavern'd*, *honied*, *careering*, *cinctured*, *boſomed*, *ſphered*, would appear affected in proſe, and yet in verſe they are warranted by great authorities, though it muſt be confeſſed that they are cenſured by an able critic *; who had ſtudied the Engliſh language, both poetical and proſaic, with wonderful diligence.

* *Johnſon.*

Some late poets, particularly the imitators of Spenſer, have introduced a great variety of uncommon words, as certes, eftſoons, ne, whilom, tranſmew, moil, ſone, loſel, albe, hight, dight, pight, thews, couthful, aſſot, muchel, wend, arrear, &c. Theſe were once poetical words, no doubt; but they are now obſolete, and to many readers unintelligible. No man of the preſent age, however converſant in this dialect, would naturally expreſs himſelf in it on any intereſting emergence; or, ſuppoſing this natural to the antiquarian, it would never appear ſo to the common hearer or reader. A mixture of theſe words, therefore, muſt ruin the pathos of modern language: and as they are not familiar to our ear, and plainly appear to be ſought after and affected, will generally give a ſtiffneſs to modern verſification. Yet in ſubjects approaching to the ludicrous they may have a good effect; as in the *Schoolmiſtreſs* of Shenſtone, Parnel's Fairy-tale, Thomſon's Caſtle of Indolence, and Pope's lines in the Dunciad upon Wormius. But this effect will be moſt pleaſing to thoſe who have leaſt occaſion to recur to the gloſſary.

Indeed, it is not always eaſy to fix the boundary between poetical and obſolete expreſſions. To many readers, *lore*, *mead*, *bale*, *blithe*, *griſly*, *fray*, *thrall*, may already appear antiquated; and to ſome the ſtyle of Spenſer, or even of Chaucer, may be as intelligible as that of Dryden. This however we may venture to affirm, that a word, which the majority of readers cannot underſtand without a gloſſary, may with reaſon be conſidered as obſolete; and ought not to be uſed in modern compoſition, unleſs revived, and recommended to the public ear, by ſome very eminent writer. There are but few words in Milton, as *nathleſs*, *tine*, *frore*, *boſky*, &c.; there are but one or two in Dryden, as *falſify* (F); and in Pope, there are none at all, which every reader of our poetry may not be ſuppoſed to underſtand: whereas in Shakeſpeare, there are many, and in Spenſer many more, for which one who knows Engliſh very well may be obliged to conſult the dictionary. The poetry of Milton, Dryden, or Pope, may therefore, in almoſt all caſes, be admitted as good authority for the uſe of a poetical word. And in them, all the words above enumerated, as poetical, and in preſent uſe, may actually be found. And of ſuch poets as may chooſe to obſerve this rule, it will not be ſaid, either that they reject the judgment of Quintilian, who recommends the neweſt of the old words, and the oldeſt of the new, or that they are inattentive to Pope's precept;

> Be not the firſt by whom the new are tried,
> Nor yet the laſt to lay the old aſide.
>
> *Eſſ. on Crit.* v. 335.

We muſt not ſuppoſe that theſe poetical words never occur at all except in poetry. Even from converſation they are not excluded: and the ancient critics allow, that they may be admitted into proſe, where they occaſionally confer dignity upon a ſublime ſubject, or heighten the ludicrous qualities of a mean one. But it is in poetry only where the frequent uſe of them does not favour of affectation.

Nor muſt we ſuppoſe them eſſential to this art. Many paſſages there are of exquiſite poetry, wherein not a ſingle phraſe occurs that might not be uſed in proſe. In fact, the influence of theſe words in adorning Engliſh verſe is not very extenſive. Some influence however they have. They ſerve to render the poetical ſtyle, firſt, more melodious; and, ſecondly, more ſolemn.

49 In which caſe they may render the poetical ſtyle more melodious

Firſt, They render the poetical ſtyle more melodious, and more eaſily reducible into meaſure. Words of unwieldy ſize, or difficult pronunciation, are never uſed by correct poets, where they can be avoided: unleſs in their ſound they have ſomething imitative of the ſenſe. Homer's poetical inflections contribute wonderfully to the ſweetneſs of his numbers: and if the reader is pleaſed to look back to the ſpecimen above given of the Engliſh poetical dialect, he will find that the words are in general well-ſounding, and ſuch as may coaleſce with other words, without producing harſh combinations. Quintilian obſerves, that poets, for the ſake of their verſe, are indulged in many liberties, not granted to the orator, of lengthening, ſhortening, and dividing their words *:—and if the Greek and Roman poets claimed this indul-

* *Inſt. Orat.* lib. x. cap. 1. § 3.

(D) Dryden in one place (Æneid ix. verſ. 1095.) uſes *Falſified* to denote *Pierced through and through*. He acknowledges, that this uſe of the word is an innovation; and has nothing to plead for it but his own authority, and that *Falſare* in Italian ſometimes means the ſame thing.

gence from neceſſity, and obtained it, the Engliſh, thoſe of them eſpecially who write in rhyme, may claim it with better reaſon; as the words of their language are leſs muſical and far leſs ſuceptible of variety in arrangement and ſyntax.

50 and ſolemn. Secondly, Such poetical words as are known to be ancient have ſomething venerable in their appearance, and impart a ſolemnity to all around them. This remark is from Quintilian; who adds, that they give to a compoſition that caſt and colour of antiquity which in painting is ſo highly valued, but which art can never effectually imitate *. Poetical words that are either not ancient, or not known to be ſuch, have, however, a pleaſing effect from aſſociation. We are accuſtomed to meet with them in ſublime and elegant writing; and hence they come to acquire ſublimity and elegance: Even as the words we hear on familiar occaſions come to be accounted familiar; and as thoſe that take their riſe among pick pockets, gamblers, and gypſies, are thought too indelicate to be uſed by any perſon of taſte or good manners. When one hears the following lines, which abound in poetical words,

> The breezy call of incenſe-breathing morn,
> The ſwallow twittering from the ſtraw-built ſhed,
> The cock's ſhrill clarion, or the echoing horn,
> No more ſhall rouſe them from their lowly bed:

—one is as ſenſible of the dignity of the language, as one would be of the vileneſs or vulgarity of that man's ſpeech, who ſhould prove his acquaintance with Bridewell, by interlarding his diſcourſe with ſuch terms as *mill-doll*, *queer cull*, or *nobbing cheat* †; or who, in imitation of fops and gamblers, ſhould on the common occaſions of life, talk of being *beat hollow*, or *ſaving his diſtance* ‡. What gives dignity to perſons gives dignity to language. A man of this character is one who has borne important employments, been connected with honourable aſſociates, and never degraded himſelf by levity or immorality of conduct. Dignified phraſes are thoſe which have been uſed to expreſs elevated ſentiments, have always made their appearance in elegant compoſition, and have never been profaned by giving permanency or utterance to the paſſions of the vile, the giddy, or the worthleſs. And as by an active old age, the dignity of ſuch men is confirmed and heightened; ſo the dignity of ſuch words, if they be not ſuffered to fall into diſuſe, ſeldom fails to improve by length of time.

Art. II. Of Tropes and Figures.

51 Tropes and figures neceſſary to poetical language, If it appear that, by means of figures, language may be made more *pleaſing* and more natural than it would be without them; it will follow, that to poetic language, whoſe end is to *pleaſe* by imitating *nature*, figures muſt be not only ornamental, but neceſſary. It will here be proper, therefore, firſt to point out the importance and utility of figurative language; ſecondly, to ſhow, that figures are more neceſſary to poetry in general than to any other mode of writing.

I. *As to the importance and utility of figurative expreſſion*, in making language more pleaſing and more natural; it may be remarked,

52 to ſupply the defects of ſimple language, and (1.) That tropes and figures are often neceſſary to ſupply the unavoidable defects of language. When *proper* words are wanting, or not recollected, or when we do not chooſe to be always repeating them, we muſt have recourſe to tropes and figures. When philoſophers began to explain the operations of the mind, they found that moſt of the words in common uſe, being framed to anſwer the more obvious exigencies of life, were in their proper ſignification applicable to matter only and its qualities. What was to be done in this caſe? Would they think of making a new language to expreſs the qualities of mind? No: that would have been difficult or impracticable; and granting it both practicable and eaſy, they muſt have foreſeen, that nobody would read or liſten to what was thus ſpoken or written in a new and conſequently in an unknown tongue. They therefore took the language as they found it; and whereever they thought there was a ſimilarity or analogy between the qualities of the mind and the qualities of matter, ſcrupled not to uſe the names of the material qualities tropically, by applying them to the mental qualities. Hence came the phraſes *ſolidity* of judgement, *warmth* of imagination, *enlargement* of underſtanding, and many others; which, though figurative, expreſs the meaning juſt as well as proper words would have done. In fact, numerous as the words in every language are, they muſt always fall ſhort of the unbounded variety of human thoughts and perceptions. Taſtes and ſmells are almoſt as numerous as the ſpecies of bodies. Sounds admit of perceptible varieties that ſurpaſs all computation, and the ſeven primary colours may be diverſified without end. If each variety of external perception were to have a name, language would be inſurmountably difficult; nay, if men were to appropriate a claſs of names to each particular ſenſe, they would multiply words exceedingly, without adding any thing to the clearneſs of ſpeech. Thoſe words, therefore, that in their proper ſignification denote the objects of one ſenſe, we often apply tropically to the objects of another, and ſay, Sweet taſte, ſweet ſmell, ſweet ſound; ſharp point, ſharp taſte, ſharp ſound; harmony of ſounds, harmony of colours, harmony of parts; ſoft ſilk, ſoft colour, ſoft ſound, ſoft temper; and ſo in a thouſand inſtances: and yet theſe words, in their tropical ſignification, are not leſs intelligible than in their proper one; for ſharp taſte and ſharp ſound, are as expreſſive as ſharp ſword; and harmony of tones is not better underſtood by the muſician, than harmony of parts by the architect, and harmony of colours by the painter.

Savages, illiterate perſons, and children, have comparatively but few words in proportion to the things they may have occaſion to ſpeak of; and muſt therefore recur to tropes and figures more frequently than perſons of copious elocution. A ſeaman, or mechanic, even when he talks of that which does not belong to his art, borrows his language from that which does; and this makes his diction figurative to a degree that is ſometimes entertaining enough. "Death (ſays a ſeaman in one of Smollet's novels) has not yet *boarded* my comrade; but they have been *yard-arm and yard-arm* theſe *three glaſſes*. His *ſtarboard* eye is open, but faſt *jammed* in his head; and the *haulyards* of his under jaw have given way." Theſe phraſes are exaggerated; but we allow them to be natural, becauſe we know that illiterate people are apt to make uſe of tropes and figures taken from their own trade, even when they ſpeak of things that are very remote and incongruous. In thoſe poems, therefore, that imitate the converſation of illiterate perſons, as in comedy, farce, and paſtoral, ſuch figures judiciouſly

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* Lib. viii. cap. 3.

† See the *Scoundrel's Dictionary*.

‡ Language of Newmarket.

Of Tropes and Figures.

diciouſly applied may render the imitation more pleaſing, becauſe more exact and natural.

53 to avoid harſhneſs of diction.

Words that are untuneable and harſh, the poet is often obliged to avoid, when perhaps he has no other way to expreſs their meaning than by tropes and figures; and ſometimes the meaſure of his verſe may oblige him to reject a proper word that is not harſh, merely on account of its being too long, or too ſhort, or in any other way unſuitable to the rhythm, or to the rhyme. And hence another uſe of figurative language, that it contributes to poetical harmony. Thus, *to preſs the plain*, is frequently uſed to ſignify *to be ſlain in battle*; *liquid plain* is put for *ocean*, *blue ſerene* for *ſky*, and *ſylvan reign* for *country life*.

54 Tropes and figures favourable to delicacy;

(2.) Tropes and figures are favourable to delicacy. When the proper name of a thing is in any reſpect unpleaſant, a well choſen trope will convey the idea in ſuch a way as to give no offence. This is agreeable, and even neceſſary, in polite converſation, and cannot be diſpenſed with in elegant writing of any kind. Many words, from their being often applied to vulgar uſe, acquire a meanneſs that diſqualifies them for a place in ſerious poetry; while perhaps, under the influence of a different ſyſtem of manners, the correſponding words in another language may be elegant, or at leaſt not vulgar. When one reads Homer in the Greek, one takes no offence at his calling Eumeus by a name which, literally rendered, ſignifies *ſwine-herd*; firſt, becauſe the Greek word is well-ſounding in itſelf; ſecondly, becauſe we have never heard it pronounced in converſation, nor conſequently debaſed by vulgar uſe; and, thirdly, becauſe we know, that the office denoted by it was, in the age of Eumeus, both important and honourable. But Pope would have been blamed, if a name ſo indelicate as *ſwine-herd* had in his tranſlation been applied to ſo eminent a perſonage; and therefore he judiciouſly makes uſe of the trope *ſynecdoche*, and calls him *ſwain* *; a word both elegant and poetical, and not likely to lead the reader into any miſtake about the perſon ſpoken of, as his employment had been deſcribed in a preceding paſſage. The ſame Eumeus is ſaid, in the ſimple but melodious language of the original, to have been making his own ſhoes when Ulyſſes came to his door; a work which in thoſe days the greateſt heroes would often find neceſſary. This, too, the tranſlator ſoftens by a tropical expreſſion:

Here ſat Eumenus, and his cares applied,
To form ſtrong *buſkins* of well ſeaſoned hide.

A hundred other examples might be quoted from this tranſlation; but theſe will explain our meaning.

There are other occaſions on which the delicacy of figurative language is ſtill more needful; as in Virgil's account of the effects of animal love, and of the plague among the beaſts, in the third Georgic; where Dryden's ſtyle, by being leſs figurative than the original, is in one place exceedingly filthy, and in another ſhockingly obſcene.

Hobbes could conſtrue a Greek author; but his ſkill in words muſt have been all derived from the dictionary; for he ſeems not to have known that any one articulate ſound could be more agreable, or any one phraſe more dignified than another. In his Iliad and Odyſſey, even when he hits the author's ſenſe (which is not always the caſe), he proves, by his choice of words, that of harmony, elegance, or energy of ſtyle, he had no manner of conception. And hence that work, though called a *Tranſlation of Homer*, does not even deſerve the name of *poem*; becauſe it is in every reſpect unpleaſing, being nothing more than a fictitious narrative delivered in mean proſe, with the additional meanneſs of harſh rhyme and untuneable meaſure.—Trapp underſtood Virgil well enough as a grammarian, and had a taſte for his beauties: yet his tranſlation bears no reſemblance to Virgil; which is owing to the ſame cauſe, an imprudent choice of words and figures, and a total want of harmony.

55 which, however, may be carried too far.

The delicacy we here contend for may, indeed, both in converſation and in writing, be carried too far. To call *killing an innocent man in a duel* an affair of honour, and *a violation of the rights of wedlock* an affair of gallantry, is a proſtitution of figurative language. Nor is it any credit to us, that we are ſaid to have upwards of 40 figurative phraſes to expreſs exceſſive drinking. Language of this ſort generally implies, that the public abhorrence of ſuch crimes is not ſo ſtrong as it ought to be: and it is a queſtion, whether even our morals might not be improved, if we were to call theſe and ſuch like crimes by their proper names, *murder*, *adultery*, *drunkenneſs*, *gluttony*; names that not only expreſs our meaning, but alſo betoken our diſapprobation.—As to writing, it cannot be denied, that even Pope himſelf, in the excellent verſion juſt now quoted, has ſometimes, for the ſake of his numbers, or for fear of giving offence by too cloſe an imitation of Homer's ſimplicity, employed tropes and figures too quaint or too ſolemn for the occaſion. And the finical ſtyle is in part characteriſed by the writer's diſlike to literal expreſſions, and affectedly ſubſtituting in their ſtead unneceſſary tropes and figures. With theſe authors, a man's only child muſt always be his *only hope*; a country maid becomes *a rural beauty*, or perhaps a *nymph of the groves*; if flattery ſing at all, it muſt be a *ſyren ſong*; the ſhepherd's flute dwindles into an *oaten reed*, and his crook is exalted into a *ſceptre*; the *ſilver lilies* riſe from their *golden beds*, and *languiſh* to the *complaining* gale. A young woman, though a good Chriſtian, cannot make herſelf agreeable without *ſacrificing to the Graces*; nor hope to do any execution among the *gentle ſwains*, till a whole legion of *Cupids*, armed with *flames* and *darts*, and other weapons, begin to diſcharge from her eyes their formidable artillery. For the ſake of variety, or of the verſe, ſome of theſe figures may now and then find a place in a poem; but in proſe, unleſs very ſparingly uſed, they favour of affectation.

56 Tropes and figures promote brevity, and

(3.) Tropes and figures promote brevity: and brevity, united with perſpicuity, is always agreeable. An example or two will be given in the next paragraph. Sentiments thus delivered, and imagery, thus painted, are readily apprehended, by the mind, make a ſtrong impreſſion upon the fancy, and remain long in the memory; whereas too many words, even when the meaning is good, never fail to bring diſguſt and wearineſs. They argue a debility of mind which hinders the author from ſeeing his thoughts in one diſtinct point of view; and they alſo encourage a ſuſpicion, that there is ſomething faulty or defective in the matter. In the poetic ſtyle, therefore, which is addreſſed to the fancy and paſſions, and intended to make a vivid, a pleaſing, and a permanent impreſſion, brevity, and conſequently tropes and figures, are indiſpenſable. And a language will always be the better ſuited to poetical purpoſes, the more it admits of this brevity;—a character which is more conſpicuous in the Greek and Latin than in any modern tongue, and much leſs in the French than in the Italian or Engliſh.

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* Odyſſey, book xiv. ver. 41.

57
Contribute to ſtrength and energy of language.

(4.) Tropes and figures contribute to ſtrength or energy of language, not only by their conciſeneſs, but alſo by conveying to the fancy ideas that are eaſily comprehended, and make a ſtrong impreſſion. We are powerfully affected with what we ſee, or feel, or hear. When a ſentiment comes enforced or illuſtrated by figures taken from objects of ſight, or touch, or hearing, one thinks, as it were, that one ſees, or feels, or hears, the thing ſpoken of; and thus, what in itſelf would perhaps be obſcure, or is merely intellectual, may be made to ſeize our attention and intereſt our paſſions almoſt as effectually as if it were an object of outward ſenſe. When Virgil calls the Scipios *thunderbolts of war*, he very ſtrongly expreſſes in one word, and by one image, the rapidity of their victories, the noiſe their atchievements made in the world, and the ruin and conſternation that attended their irreſiſtible career.—When Homer calls Ajax *the bulwark of the Greeks*, he paints with equal brevity his vaſt ſize and ſtrength, the difficulty of prevailing againſt him, and the confidence wherewith his countrymen repoſed on his valour.—When Solomon ſays of the ſtrange woman, or harlot, that "her feet go *down* to death," he lets us know, not only that her path ends in deſtruction, but alſo, that they who accompany her will find it eaſy to go forwards to ruin, and difficult to return to their duty.—Satan's enormous magnitude, and refulgent appearance, his perpendicular aſcent through a region of darkneſs, and the inconceivable rapidity of his motion, are all painted out to our fancy by Milton, in one very ſhort ſimilitude,

> Sprung upward, like—a pyramid of fire.
> *Par. Loſt.* iv. 1013.

To take in the full meaning of which figure, we muſt imagine ourſelves in chaos, and a vaſt luminous body riſing upwards, near the place where we are, ſo ſwiftly as to appear a continued track of light, and leſſening to the view according to the increaſe of diſtance, till it end in a point, and then diſappear; and all this muſt be ſuppoſed to ſtrike our eye at one inſtant.——Equal to this in propriety, though not in magnificence, is that allegory of Gray,

> The paths of glory lead but to the grave:

Which preſents to the imagination a wide plain, where ſeveral roads appear, crowded with glittering multitudes, and iſſuing from different quarters, but drawing nearer and nearer as they advance, till they terminate in the dark and narrow houſe, where all their glories enter in ſucceſſion, and diſappear for ever.——When it is ſaid in Scripture, of a good man who died, that he *fell aſleep*, what a number of ideas are at once conveyed to our imagination, by this beautiful and expreſſive figure: As a labourer, at the cloſe of day, goes to ſleep, with the ſatisfaction of having performed his work, and with the agreeable hope of awaking in the morning of a new day, refreſhed and cheerful; ſo a good man, at the end of life, reſigns himſelf calm and contented to the will of his Maker, with the ſweet reflection of having endeavoured to do his duty, and with the tranſporting hope of ſoon awaking in the regions of light, to life and happineſs eternal. The figure alſo ſuggeſts, that to a good man the tranſition from life to death is, even in the ſenſation, no more painful, than when our faculties melt away into the pleaſing inſenſibility of ſleep.——Satan, flying among the ſtars, is ſaid by Milton to "*ſail* between worlds and worlds;" which has an elegance and force far ſuperior to the proper word *fly*. For by this alluſion to a ſhip, we are made to form a lively idea of his great ſize, and to conceive of his motion, that it was equable and majeſtic.——Virgil uſes a happy figure to expreſs the ſize of the great wooden horſe, by means of which the Greeks were conveyed into Troy: "Equum divina Palladis arte *ædificant*."——Milton is ſtill bolder when he ſays,

> Who would not ſing for Lycidas! he knew
> Himſelf to ſing, and *build the lofty rhyme*.

The phraſe, however, though bold, is emphatical; and gives a noble idea of the durability of poetry, as well as of the art and attention requiſite to form a good poem.——There are hundreds of tropical expreſſions in common uſe, incomparably more energetic than any proper words of equal brevity that could be put in their place. A cheek *burning* with bluſhes, is a trope which at once deſcribes the colour as it appears to the beholder, and the glowing heat as it is felt by the perſon bluſhing. *Chilled* with deſpondence, *petrified* with aſtoniſhment, *thunderſtruck* with diſagreeable and unexpected intelligence, *melted* with love or pity, *diſſolved* in luxury, *hardened* in wickedneſs, *ſoftening* into remorſe, *inflamed* with deſire, *toſſed* with uncertainty, &c.—every one is ſenſible of the force of theſe and the like phraſes, and that they muſt contribute to the energy of compoſition.

58
They are likewiſe the language of ſtrong paſſion.

(5.) Tropes and figures promote ſtrength of expreſſion; and are in poetry peculiarly requiſite, becauſe they are often more *natural*, and more *imitative*, than proper words. In fact, this is ſo much the caſe, that it would be impoſſible to imitate the language of paſſion without them. It is true, that when the mind is agitated, one does not run out into allegories, or long-winded ſimilitudes, or any of the figures that require much attention and many words, or that tend to withdraw the fancy from the object of the paſſion. Yet the language of many paſſions muſt be figurative notwithſtanding; becauſe they rouſe the fancy, and direct it to objects congenial to their own nature, which diverſify the language of the ſpeaker with a multitude of alluſions. The fancy of a very angry man, for example, preſents to his view a train of diſagreeable ideas connected with the paſſion of anger, and tending to encourage it; and if he ſpeak without reſtraint during the paroxyſm of his rage, thoſe ideas will force themſelves upon him, and compel him to give them utterance. "Infernal monſter! (he will ſay),—my blood boils at him; he has uſed me like a dog; never was man ſo injured as I have been by this barbarian. He has no more ſenſe of propriety than a ſtone. His countenance is diabolical, and his ſoul as ugly as his countenance. His heart is cold and hard, and his reſolutions dark and bloody," &c. This ſpeech is wholly figurative. It is made up of *metaphors* and *hyperboles*, which, with the *proſopopeia* and *apoſtrophe*, are the moſt paſſionate of all the figures. Lear, driven out of doors by his unnatural daughters, in the midſt of darkneſs, thunder, and tempeſt, naturally

rally breaks forth (for his indignation is juſt now raiſed to the very higheſt pitch) into the following violent exclamation againſt the crimes of mankind, in which almoſt every word is figurative.

Tremble, thou wretch,
That haſt within thee undivulged crimes
Unwhipt of juſtice. Hide thee, thou bloody hand,
Thou perjur'd, and thou ſimular of virtue,
That art inceſtuous. Caitiff, to pieces ſhake,
That under covert, and convenient ſeeming,
Haſt practis'd on man's life. Cloſe pent-up guilts,
Rive your concealing continents, and cry
Theſe dreadful ſummoners grace. *King Lear.*

——The vehemence of maternal love, and ſorrow from the apprehenſion of loſing her child, make the Lady Conſtance utter a language that is ſtrongly figurative, though quite ſuitable to the condition and character of the ſpeaker. The paſſage is too long for a quotation, but concludes thus:

O Lord! my boy, my Arthur, my fair ſon,
My life, my joy, my food, my all the world,
My widow-comfort, and my ſorrow's cure. *King John.*

——Similar to this, and equally expreſſive of conjugal love, is that beautiful hyperbole in Homer; where Andromache, to diſſuade her huſband from going out to the battle, tells him that ſhe had now no mother, father, or brethren, all her kindred being dead, and her native country deſolate; and then tenderly adds,

But while my Hector yet ſurvives, I ſee
My father, mother, brethren, all in thee. *Iliad*, b. vi.

59
The ſimpleſt language moſt ſuitable to depreſſing paſſions,

As the paſſions that agitate the ſoul, and rouſe the fancy, are apt to vent themſelves in tropes and figures, ſo thoſe that depreſs the mind adopt for the moſt part a plain diction without any ornament: for to a dejected mind, wherein the imagination is generally inactive, it is not probable that any great variety of ideas will preſent themſelves; and when theſe are few and familiar, the words that expreſs them muſt be ſimple. As no author equals Shakeſpeare in boldneſs or variety of figures when he copies the ſtyle of thoſe violent paſſions that ſtimulate the fancy; ſo, when he would exhibit the human mind in a dejected ſtate, no uninſpired writer excels him in ſimplicity. The ſame Lear whoſe reſentment had impaired his underſtanding, while it broke out in the moſt boiſterous language, when, after ſome medical applications, he recovers his reaſon, his rage being now exhauſted, his pride humbled, and his ſpirits totally depreſſed, ſpeaks in a ſtyle than which nothing can be imagined more ſimple or more affecting.

Pray, do not mock me:
I am a very fooliſh, fond old man,
Fourſcore and upward; and, to deal plainly with you,
I fear I am not in my perfect mind.
Methinks I ſhould know you, and know this man;
Yet I am doubtful: for I am mainly ignorant
What place this is; and all the ſkill I have
Remembers not theſe garments: nor I know not
Where I did lodge laſt night. *Lear*, Act iv. ſc. 7.

——Deſdemona, ever gentle, artleſs, and ſincere, ſhocked at the unkindneſs of her huſband, and overcome with melancholy, ſpeaks in a ſtyle ſo beautifully ſimple, and ſo perfectly natural, that one knows not what to ſay in commendation of it:

My mother had a maid call'd Barbara;
She was in love, and he ſhe lov'd prov'd falſe,
And did forſake her. She had a ſong of willow;
An old thing it was, but it expreſs'd her fortune,
And ſhe died ſinging it. That ſong to-night
Will not go from my mind: I have much to do,
But to go hang my head all at one ſide,
And ſing it like poor Barbara. *Othello*, Act iv. ſc. 3.

Sometimes the imagination, even when exerted to the utmoſt, takes in but few ideas. This happens when the attention is totally engroſſed by ſome very great object; admiration being one of thoſe emotions that rather ſuſpend the exerciſe of the faculties than puſh them into action. And here, too, the ſimpleſt language is the moſt natural; as when Milton ſays of the Deity, that he ſits "high-throned above all height." And as this ſimplicity is more ſuitable to that one great exertion which occupies the ſpeaker's mind than a more elaborate imagery or language would have been, ſo has it alſo a more powerful effect in fixing and elevating the imagination of the hearer; for to introduce other thoughts for the ſake of illuſtrating what cannot be illuſtrated, could anſwer no other purpoſe than to draw off the attention from the principal idea. In theſe and the like caſes, the fancy left to itſelf will have more ſatisfaction in purſuing at leiſure its own ſpeculations than in attending to thoſe of others; as they who ſee for the firſt time ſome admirable object would chooſe rather to feaſt upon it in ſilence, than to have their thoughts interrupted by a long deſcription from another perſon, informing them of nothing but what they ſee before them, are already acquainted with, or may eaſily conceive.

60
and to the ſentiment of admiration.

It was remarked above that the *hyperbole*, *proſopopeia*, and *apoſtrophe*, are among the moſt paſſionate figures. This deſerves illuſtration.

61
Hyperbole natural to the paſſion of anger, love, fear, &c.

1ſt, A very angry man is apt to think the injury he has juſt received greater than it really is; and if he proceed immediately to retaliate by word or deed, ſeldom fails to exceed the due bounds, and to become injurious in his turn. The fond parent looks upon his child as a prodigy of genius and beauty; and the romantic lover will not be perſuaded that his miſtreſs has nothing ſupernatural either in her mind or perſon. Fear, in like manner, not only magnifies its object when real, but even forms an object out of nothing, and miſtakes the fictions of fancy for the intimations of ſenſe.—No wonder, then, that they who ſpeak according to the impulſe of paſſion ſhould ſpeak *hyperbolically*; that the angry man ſhould exaggerate the injury he has received, and the vengeance he is going to inflict; that the ſorrowful ſhould magnify what they have loſt, and the joyful what they have obtained; that the lover ſhould ſpeak extravagantly of the beauty of his miſtreſs, the coward of the dangers he has encountered, and the credulous clown of the miracles performed by the juggler. In fact, theſe people would not do juſtice to what they feel if they did not ſay more than the truth. The valiant man, on the other hand, as naturally adopts the diminiſhing hyperbole when he ſpeaks of danger; and the man of ſenſe, when he is obliged to mention his own virtue or ability; becauſe it appears to him, or he is willing to

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conſider it, as leſs than the truth, or at beſt as inconſiderable. Contempt uſes the ſame figure; and therefore Petruchio, affecting that paſſion, affects alſo the language of it:

> Thou lieſt, thou thread, thou thimble,
> Thou yard, three-quarters, half-yard, quarter, nail,
> Thou flea, thou nit, thou winter-cricket, thou!
> Brav'd in mine own houſe with a ſkein of thread!
> Away, thou rag, thou quantity, thou remnant!
> *Taming of the Shrew*, Act iv. ſc. 1.

For ſome paſſions conſider their objects as important, and others as unimportant. Of the former ſort are anger, love, fear, admiration, joy, ſorrow, pride; of the latter are contempt and courage. Thoſe may be ſaid to ſubdue the mind to the object, and theſe to ſubdue the object to the mind. And the former, when violent, always magnify their objects: whence the hyperbole called amplification, or *auxeſis:* and the latter as conſtantly diminiſh theirs; and give riſe to the hyperbole called *meioſis*, or diminution.—Even when the mind cannot be ſaid to be under the influence of any violent paſſion, we naturally employ the ſame figure when we would impreſs another very ſtrongly with any idea. "He is a walking ſhadow: he is worn to ſkin and bone; he has one foot in the grave and the other following:"—theſe, and the like phraſes, are proved to be natural by their frequency. By introducing great ideas, the hyperbole is further uſeful in poetry as a ſource of the ſublime; but when employed injudiciouſly is very apt to become ridiculous. Cowley makes Goliah as big us the hill down which he was marching *; and tells us, that when he came into the valley he ſeemed to fill it, and to overtop the neighbouring mountains (which, by the by, ſeems rather to leſſen the mountains and valleys than to magnify the giant): nay, he adds, that the ſun ſtarted back when he ſaw the ſplendour of his arms. This poet ſeems to have thought that the figure in queſtion could never be ſufficiently enormous; but Quintilian would have taught him, "Quamvis omnis hyperbole ultra fidem, non tamen eſſe debet ultra modum." The reaſon is, that this figure, when exceſſive, betokens rather abſolute infatuation than intenſe emotion; and reſembles the efforts of a ranting tragedian, or the ravings of an enthuſiaſtic declaimer, who, by putting on the geſtures and looks of a lunatic, ſatisfy the diſcerning part of their audience, that, inſtead of feeling ſtrongly, they have no rational feelings at all. In the wildeſt energies of nature there is a modeſty which the imitative artiſt will be careful never to overſtep.

62
Proſopopœia, when proper.

2dly, That figure, by which things are ſpoken of as if they were perſons, is called *proſopopœia*, or *perſonification.* It is a bold figure, and yet is often natural. Long acquaintance recommends to ſome ſhare in our affection even things inanimate, as a houſe, a tree, a rock, a mountain, a country; and were we to leave ſuch a thing without hope of return, we ſhould be inclined to addreſs it with a farewel, as if it were a percipient creature. Hence it was that Mary queen of Scotland, when on her return to her own kingdom, ſo affectionately bade adieu to the country which ſhe had left. "Farewel France," ſaid ſhe; "farewel, beloved country, which I ſhall never more behold!" Nay, we find that ignorant nations have actually worſhipped ſuch things, or conſidered them as the haunt of certain powerful beings. Dryads and

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hamadryads were by the Greeks and Romans ſuppoſed to preſide over trees and groves; river gods and nymphs, over ſtreams and fountains; little deities, called *Lares* and *Penates*, were believed to be the guardians of hearths and houſes. In Scotland there is hardly a hill remarkable for the beauty of its ſhape, that was not in former times thought to be the habitation of fairies. Nay, modern as well as ancient ſuperſtition has appropriated the waters to a peculiar ſort of demon or goblin, and people the very regions of death, the tombs and charnel-houſes, with multitudes of ghoſts and phantoms.—Beſides, when things inanimate make a ſtrong impreſſion upon us, whether agreeable or otherwiſe, we are apt to addreſs them in terms of affection or diſlike. The ſailor bleſſes the plank that brought him aſhore from the ſhipwreck; and the paſſionate man, and ſometimes even the philoſopher, will ſay bitter words to the ſtumbling-block that gave him a fall.—Moreover, a man agitated with any intereſting paſſion, eſpecially of long continuance, is apt to fancy that all nature ſympathiſes with him. If he has loſt a beloved friend, he thinks the ſun leſs bright than at other times; and in the ſighing of the winds and groves, in the lowings of the herd, and in the murmurs of the ſtream, he ſeems to hear the voice of lamentation. But when joy or hope predominate, the whole world aſſumes a gay appearance. In the contemplation of every part of nature, of every condition of mankind, of every form of human ſociety, the benevolent and the pious man, the moroſe and the cheerful, the miſer and the miſanthrope, finds occaſion to indulge his favourite paſſion, and ſees, or thinks he ſees, his own temper reflected back in the actions, ſympathies, and tendencies of other things and perſons. Our affections are indeed the medium through which we may be ſaid to ſurvey ourſelves, and every thing elſe; and whatever be our inward frame, we are apt to perceive a wonderful congeniality in the world without us. And hence the fancy, when rouſed by real emotions, or by the pathos of compoſition, is eaſily reconciled to thoſe figures of ſpeech that aſcribe ſympathy, perception, and the other attributes of animal life, to things inanimate, or even to notions merely intellectual.—Motion, too, bears a cloſe affinity to action, and affects our imagination nearly in the ſame manner; and we ſee a great part of nature in motion, and by its ſenſible effects are led to contemplate energies innumerable. Theſe conduct the rational mind to the Great Firſt Cauſe; and theſe, in times of ignorance, diſpoſed the vulgar to believe in a variety of ſubordinate agents employed in producing thoſe appearances that could not otherwiſe be accounted for. Hence an endleſs train of fabulous deities, and of witches, demons, fairies, genii; which, if they prove our reaſon weak and our fancy ſtrong, prove alſo that perſonification is natural to the human mind; and that a right uſe of this figure may have a powerful effect, in fabulous writing eſpecially, to engage our ſympathy in behalf of things as well as perſons: for nothing can give laſting delight to a moral being, but that which awakens ſympathy, and touches the heart; and though it be true that we ſympathiſe in ſome degree even with inanimate things, yet what has, or is ſuppoſed to have, life, calls forth a more ſincere and more permanent fellow-feeling.—Let it be obſerved further, that to awaken our ſympathetic feelings, a lively conception of their object is neceſſary. This indeed is true of almoſt all our emotions; their keenneſs is in proportion

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* *Davideis*, book iii.

portion to the vivacity of the perceptions that excite them. Diſtreſs that we ſee is more affecting than what we only hear of *; a peruſal of the gayeſt ſcenes in a comedy does not rouſe the mind ſo effectually as the preſence of a cheerful companion; and the death of a friend is of greater energy in producing ſerioufneſs, and the conſideration of our latter end, than all the pathos of Young. Of deſcriptions addreſſed to the fancy, thoſe that are moſt vivid and picturesque will generally be found to have the moſt powerful influence over our affections; and thoſe that exhibit perſons engaged in action, and adorned with viſible inſignia, give a briſker impulſe to the faculties than ſuch as convey intellectual ideas only, or images taken from ſtill life. No abſtract notion of time, or of love, can be ſo ſtriking to the fancy as the image of an old man accoutred with a ſcythe, or of a beautiful boy with wings and a bow and arrows: and no phyſiological account of frenzy could ſuggeſt ſo vivid an idea as the poet has given us in that exquiſite portrait,

> And moody madneſs laughing wild amid ſevereſt wo.

And for this reaſon partly it is that the epic poet, in order to work the more effectually upon our paſſions and imagination, refers the ſecret ſprings of human conduct, and the viciſſitudes of human affairs, to the agency of perſonified cauſes; that is, to the machinery of gods and goddeſſes, angels, demons, magicians, and other powerful beings. And hence, in all ſublime poetry, life and motion, with their ſeveral modes and attributes, are liberally beſtowed on thoſe objects wherewith the author intends that we ſhould be ſtrongly impreſſed: ſcenes perfectly inanimate and ſtill, tending rather to diffuſe a languor over the mind than to communicate to our internal powers thoſe lively energies without which a being eſſentially active can never receive complete gratification. —Laſtly, ſome violent paſſions are peculiarly inclined to change things into perſons. The horrors of his mind haunted Oreſtes in the ſhape of furies. Conſcience, in the form of the murdered perſon, ſtares the murderer in the face, and often terrifies him to diſtraction. The ſuperſtitious man, travelling alone in the dark, miſtakes a white ſtone for a ghoſt, a buſh for a demon, a tree waving with the wind for an enormous giant brandiſhing a hundred arms. The lunatic and enthuſiaſt converſe with perſons who exiſt only in their own diſtempered fancy; and the glutton and the miſer, if they were to give utterance to all their thoughts, would often, it is preſumable, ſpeak, the one of his gold, the other of his belly, not only as a perſon, but as a god,—the object of his warmeſt love and moſt devout regard.—More need not be ſaid to prove that perſonification is natural, and may frequently contribute to the pathos, energy, and beauty of poetic language.

63 Apoſtrophe how to be uſed.

3dly, *Apoſtrophe*, or a ſudden diverſion of ſpeech from one perſon to another perſon or thing, is a figure nearly related to the former. Poets ſometimes make uſe of it, in order to help out their verſe, or merely to give variety to their ſtyle: but on theſe occaſions it is to be conſidered as rather a trick of art, than an effort of nature. It is moſt natural, and moſt pathetic, when the perſon or thing to whom the apoſtrophe is made, and for whoſe ſake we give a new direction to our ſpeech, is in our eyes eminently diſtinguiſhed for good or evil, or raiſes within us ſome ſudden and powerful emotion, ſuch as the hearer would acquieſce in, or at leaſt acknowledge to be reaſonable. But this, like the other pathetic figures, muſt be uſed with great prudence. For if, inſtead of calling forth the hearer's ſympathy, it ſhould only betray the levity of the ſpeaker, or ſuch wanderings of his mind as neither the ſubject nor the occaſion would lead one to expect, it will then create diſguſt inſtead of approbation. The orator, therefore, muſt not attempt the paſſionate apoſtrophe, till the minds of the hearers be prepared to join in it. And every audience is not equally obſequious in this reſpect. In the forum of ancient Rome that would have paſſed for ſublime and pathetic, which in the moſt reſpectable Britiſh auditories would appear ridiculous. For our ſtyle of public ſpeaking is cool and argumentative; and partakes leſs of enthuſiaſm than the Roman did, and much leſs than the modern French or Italian. Of Britiſh eloquence, particularly that of the pulpit, the chief recommendations are gravity and ſimplicity. And it is vain to ſay, that our oratory *ought* to be more vehement: for that matter depends on cauſes, which it is not only inexpedient, but impoſſible to alter; namely, on the character and ſpirit of the people, and their rational notions in regard to religion, policy, and literature. The exclamations of Cicero would weigh but little in our parliament; and many of thoſe which we meet with in French ſermons would not be more effectual if attempted in our pulpit. To ſee one of our preachers, who the moment before was a cool reaſoner, a temperate ſpeaker, an humble Chriſtian, and an orthodox divine, break out into a ſudden apoſtrophe to the immortal powers, or to the walls of the church, tends to force a ſmile, rather than a tear, from thoſe among us who reflect, that there is nothing in the ſubject, and ſhould be nothing in the orator, to warrant ſuch wanderings of fancy or vehemence of emotion. If he be careful to cultivate a pure ſtyle, and a grave and graceful utterance, a Britiſh clergyman, who ſpeaks from conviction the plain unaffected words of truth and ſoberneſs, of benevolence and piety, will, it is believed, convey more pathetic, as well as more permanent, impreſſions to the heart, and be more uſeful as a Chriſtian teacher, than if he were to put in practice all the attitudes of Roſcius, and all the tropes and figures of Cicero.

But where the language of paſſion and enthuſiaſm is permitted to diſplay itſelf, whatever raiſes any ſtrong emotion, whether it be animated or inanimate, abſent or preſent, ſenſible or intellectual, may give riſe to the apoſtrophe. A man in a diſtant country, ſpeaking of the place of his birth, might naturally exclaim, "O my dear native land, ſhall I never ſee thee more!" Or, when ſome great misfortune befals him, "Happy are ye, O my parents, that ye are not alive to ſee this." We have a beautiful apoſtrophe in the third book of the Æneid, where Æneas, who is telling his ſtory to Dido, happening to mention the death of his father, makes a ſudden addreſs to him as follows:

> ——— hic, pelagi tot tempeſtatibus actus,
> Heu, genitorem, omnis curæ caſuſque levamen,
> Amitto Anchiſen:—hic me, pater optime, feſſum
> Deſeris, heu, tantis nequicquam erepte periclis!

This apoſtrophe has a pleaſing effect. It ſeems to intimate, that the love which the hero bore his father was ſo great, that when he mentioned him he forgot every thing elſe; and, without minding his company, one of whom was a queen, ſuddenly addreſſed himſelf to that perſon, who, though preſent only in idea, was ſtill a principal object of his affection. An emotion ſo warm and ſo reaſonable cannot fail to command the ſympathy of the reader.——When Michael, in the eleventh book of Paradiſe Loſt, announces to Adam and Eve the neceſſity of their immediate departure from the garden of Eden, the poet's art in preſerving the decorum of the two characters is very remarkable. Pierced to the heart at the thought of leaving that happy place, Eve, in all the violence of ungovernable ſorrow, breaks forth into a pathetic apoſtrophe to Paradiſe, to the flowers ſhe had reared, and to the nuptial bower ſhe had adorned. Adam makes no addreſs to the walks, the trees, or the flowers of the garden, the loſs whereof did not ſo much afflict him; but, in his reply to the Archangel, expreſſes, without a figure, his regret for being baniſhed from a place where he had been ſo often honoured with a ſenſible manifeſtation of the divine preſence. The uſe of the apoſtrophe in the one caſe, and the omiſſion of it in the other, not only gives a beautiful variety to the ſtyle, but alſo marks that ſuperior elevation and compoſure of mind, by which the poet had all along diſtinguiſhed the character of Adam.—One of the fineſt applications of this figure that is anywhere to be ſeen, is in the fourth book of the ſame poem; where the author, catching by ſympathy the devotion of our firſt parents, ſuddenly drops his narrative, and joins his voice to theirs in adoring the Father of the univerſe.

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* Hor. Ar. Poet. v. 180.

> Thus at their ſhady lodge arriv'd, both ſtood,
> Both turn'd, and under open ſky ador'd
> The God that made both ſky, air, earth, and heav'n,
> Which they beheld, the moon's reſplendent globe,
> And ſtarry pole:—Thou alſo mad'ſt the night,
> Maker omnipotent! and thou the day,
> Which we in our appointed work employ'd
> Have finiſh'd.————

Milton took the hint of this fine contrivance from a well-known paſſage of Virgil:

> Hic juvenum chorus, ille ſenum; qui carmine laudes
> Herculeas et facta ferant;————
> ————ut duros mille labores
> Rege ſub Euryſtheo, fatis Junonis iniquæ,
> Pertulerit:—Tu nubigenas, invicte, bimembres,
> Hylæumque, Pholumque manu, tu Creſia mactas
> Prodigia.————

The beauty ariſing from diverſified compoſition is the ſame in both, and very great in each. But every reader muſt *feel*, that the figure is incomparably more affecting to the mind in the imitation than in the original. So true it is, that the moſt rational emotions raiſe the moſt intenſe fellow-feeling; and that the apoſtrophe is then the moſt emphatical, when it diſplays thoſe workings of human affection which are at once ardent and well-founded.

64
Tropes and figures are uſeful, as they ſuggeſt an endleſs variety of agreeable images.

To conclude this head: Tropes and figures, particularly the *metaphor*, *ſimilitude*, and *allegory*, are further uſeful in beautifying language, by ſuggeſting, together with the thoughts eſſential to the ſubject, an endleſs variety of agreeable images, for which there would be no place, if writers were always to confine themſelves to the *proper* names of things. And this beauty and variety, judiciouſly applied, is ſo far from diſtracting, that it tends rather to fix the attention, and captivate the heart of the readers, by giving light, and life, and pathos, to the whole compoſition.

II. That tropes and figures are more neceſſary to poetry, than to any other mode of writing, was the ſecond point propoſed to be illuſtrated in this ſection.

65
Tropes and figures more neceſſary to poetry than to any other mode of writing.

Language, as already obſerved, is then natural, when it is ſuitable to the ſuppoſed condition of the ſpeaker. Figurative language is peculiarly ſuitable to the ſuppoſed condition of the poet; becauſe figures are ſuggeſted by the fancy; and the fancy of him who compoſes poetry is more employed than that of any other author. Of all hiſtorical, philoſophical, and theological reſearches, the object is *real* truth, which is fixed and permanent. The aim of rhetorical declamation (according to Cicero) is *apparent* truth; which, being leſs determinate, leaves the fancy of the ſpeaker more free, gives greater ſcope to the inventive powers, and ſupplies the materials of a more figurative phraſeology. But the poet is ſubject to no reſtraints, but thoſe of veriſimilitude; which is ſtill leſs determinate than rhetorical truth. He ſeeks not to convince the judgement of his reader by arguments of either real or apparent cogency; he means only to pleaſe and intereſt him, by an appeal to his ſenſibility and imagination. His own imagination is therefore continually at work, ranging through the whole of real and probable exiſtence, "glancing from heaven to earth, from earth to heaven," in queſt of images and ideas ſuited to the emotions he himſelf feels, and to the ſympathies he would communicate to others. And, conſequently, figures of ſpeech, the offſpring of excurſive fancy, muſt (if he ſpeak according to what he is ſuppoſed to think and feel, that is, according to his ſuppoſed condition) tincture the language of the poet more than that of any other compoſer. So that, if figurative diction be unnatural in geometry, becauſe all wanderings of fancy are unſuitable, and even impoſſible, to the geometrician, while intent upon his argument; it is, upon the ſame principle, perfectly natural, and even unavoidable, in poetry; becauſe the more a poet attends to his ſubject, and the better qualified he is to do it juſtice, the more active will his imagination be, and the more diverſified the ideas that preſent themſelves to his mind.——Beſides, the true poet addreſſes himſelf to the paſſions and ſympathies of mankind; which, till his own be raiſed, he cannot hope to do with ſucceſs. And it is the nature of many paſſions, though not of all, to increaſe the activity of imagination: and an active imagination naturally vents itſelf in figurative language; nay, unleſs reſtrained by a correct taſte, has a tendency to exceed in it; of which Biſhop Taylor and Lord Verulam, two geniuſes different in kind, but of the higheſt order, are memorable examples.

We ſaid, that "the poet ſeeks not to convince the judgment of his reader by arguments of either real or apparent cogency."——We do not mean, that in poetry argument has no place. The moſt legitimate reaſoning, the ſoundeſt philoſophy, and narratives purely hiſtorical, may appear in a poem, and contribute greatly to the honour of the author, and to the importance of his work. All this we have in Paradiſe Loſt. We mean, that what diſtinguiſhes *pure* poetry from other writing, is its aptitude, not to ſway the judgment by reaſoning, but to pleaſe the fancy, and move the paſſions, by a lively imitation of nature. Nor would we exclude poetical embelliſhment from hiſtory, or even from philoſophy. Plato's Dialogues and the Moral Eſſays of Addiſon and Johnſon abound in poetic imagery; and Livy and Tacitus often amuſe their readers with poetical deſcription. In like manner, though geometry and phyſics be different ſciences; though abſtract ideas be the ſubject, and pure demonſtration or intuition the evidence, of the former; and though the material univerſe, and the informations of ſenſe, be the ſubject and the evidence of the latter; yet have theſe ſciences been united by the beſt philoſophers, and very happy effects reſulted from the union.——In one and the ſame work, poetry, hiſtory, philoſophy, and oratory, may doubtleſs be blended; nay, theſe arts have all been actually blended in one and the ſame work, not by Milton only, but alſo by Homer, Virgil, Lucan, and Shakeſpeare. Yet ſtill theſe arts are different; different in their ends and principles, and in the faculties of the mind to which they are reſpectively addreſſed: and it is eaſy to perceive when a writer employs one and when another.

§ 2. *Of the SOUND of Poetical Language.*

66 The poet ought to attend to the harmony of language, which conſiſts in

As the ear, like every other perceptive faculty, is capable of gratification, regard is to be had to the ſound of words, even in proſe. But to the harmony of language, it behoves the poet, more than any other writer, to attend; as it is more eſpecially his concern to render his work pleaſurable. In fact, we find, that no poet was ever popular who did not poſſeſs the art of harmonious compoſition.

What belongs to the ſubject of Poetical Harmony may be referred to one or other of theſe heads, *Sweetneſs*, *Meaſure*, and *Imitation*.

67 ſweetneſs and

I. In order to give *ſweetneſs* to language, either in verſe or proſe, all words of harſh ſound, difficult pronunciation, or unwieldy magnitude, are to be avoided as much as poſſible, unleſs when they have in the ſound ſomething peculiarly emphatical; and words are to be ſo placed in reſpect of one another, as that diſcordant combinations may not reſult from their union. But in poetry this is more neceſſary than in proſe; poetical language being underſtood to be an imitation of natural language improved to that perfection which is conſiſtent with probability. To poetry, therefore, a greater latitude muſt be allowed than to proſe, in expreſſing, by tropes and figures of pleaſing ſound, thoſe ideas whereof the proper names are in any reſpect offenſive, either to the ear or to the fancy.

II. How far verſification or *regular meaſure* may be eſſential to this art, has been diſputed by critical writers; ſome holding it to be indiſpenſably neceſſary, and ſome not neceſſary at all.

68 meaſure, which, though not eſſential,

The fact ſeems to be, as already hinted, that to poetry verſe is not eſſential. In a proſe work, we may have the fable, the arrangement, and a great deal of the pathos and language, of poetry; and ſuch a work is certainly a poem, though perhaps not a perfect one. For how abſurd would it be to ſay, that by changing the poſition only of a word or two in each line, one might diveſt Homer's Iliad of the poetical character! At this rate, the arts of poetry and verſification would be the ſame; and the rules in Deſpauterius's Grammar, and the moral diſtichs aſcribed to Cato, would be as real poetry as any part of Virgil. In fact, ſome very ancient poems, when tranſlated into a modern tongue, are far leſs poetical in verſe than in proſe; the alterations neceſſary to adapt them to our numbers being detrimental to their ſublime ſimplicity; of which any perſon of taſte will be ſenſible, who compares our common proſe-verſion of Job, the Pſalms, and the Song of Solomon, with the beſt metrical paraphraſes of them that have yet appeared. Nay, in many caſes, Comedy will be more poetical, becauſe more pleaſing and natural, in proſe than in verſe. By verſifying Tom Jones, and The Merry Wives of Windſor, we ſhould ſpoil the two fineſt comic poems, the one epic, the other dramatical, now in the world.

69 is neceſſary to the perfection of poetry.

But, ſecondly, though verſe be not eſſential to poetry, it is neceſſary to the perfection of all poetry that admits of it. Verſe is to poetry, what colours are to painting (G). A painter might diſplay great genius, and draw maſterly figures with chalk or ink; but if he intend a perfect picture, he muſt employ in his work as many colours as are ſeen in the object he imitates. Or, to adopt a beautiful compariſon of Demoſthenes, quoted by Ariſtotle *, "Verſification is to poetry what bloom is to the human countenance." A good face is agreeable when the bloom is gone, and good poetry may pleaſe without verſification; harmonious numbers may ſet off an indifferent poem, and a fine bloom indifferent features: but, without verſe, poetry is incomplete; and beauty is not perfect, unleſs to ſweetneſs and regularity of feature there be ſuperadded

The bloom of young deſire, and purple light of love.

If numbers be neceſſary to the perfection of the higher poetry, they are no leſs ſo to that of the lower kinds, to Paſtoral, Song, and Satire, which have little beſides the language and verſification to diſtinguiſh them from proſe; and which ſome ancient authors are unwilling to admit to the rank of poems: though it ſeems too nice a ſcruple, both becauſe ſuch writings are commonly termed *poetical;* and alſo becauſe there is, even in them, ſomething that may not improperly be conſidered as an imitation of nature.

That the rhythm and meaſure of verſe are naturally agreeable, and therefore that by theſe poetry may be made more pleaſing than it would be without them, is evident from this, that children and illiterate people, whoſe admiration we cannot ſuppoſe to be the effect of habit or prejudice, are exceedingly delighted with them. In many proverbial ſayings, where there is neither rhime nor alliteration, rhythm is obviouſly ſtudied. Nay, the uſe of rhythm in poetry is univerſal; whereas alliteration and

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* *Rhetor.* lib. iii. cap. 4.

(G) Horace ſeems to hint at the ſame compariſon, when, after ſpecifying the ſeveral ſorts of verſe ſuitable to Epic, Elegiac, Lyric, and Dramatic Poetry, he adds,

> Deſcriptas ſervare vices, *operumque colores*,
> Cur ego, ſi nequeo ignoroque, Poeta ſalutor? *Ar. Poet.* ver. 86.

and rhime, though reliſhed by ſome nations, are not much ſought after by others. And we need not be at a loſs to account for the agreeableneſs of proportion and order, if we reflect, that they ſuggeſt the agreeable ideas of contrivance and ſkill, at the ſame time that they render the connection of things obvious to the underſtanding, and imprint it deeply on the memory. Verſe, by promoting diſtinct and eaſy remembrance, conveys ideas to the mind with energy, and enlivens every emotion the poet intends to raiſe in the reader or hearer. Beſides, when we attend to verſes, after hearing one or two, we become acquainted with the meaſure, which, therefore, we always look for in the ſequel. This perpetual interchange of hope and gratification is a ſource of delight; and to this in part is owing the pleaſure we take in the rhimes of modern poetry. And hence we ſee, that though an incorrect rhime or untuneable verſe be in itſelf, and compared with an important ſentiment, a very trifling matter; yet it is no trifle in regard to its effects on the hearer; becauſe it brings diſappointment, and ſo gives a temporary ſhock to the mind, and interrupts the current of the affections; and becauſe it ſuggeſts the diſagreeable ideas of negligence or want of ſkill on the part of the author. And therefore, as the public ear becomes more delicate, the negligence will be more glaring, and the diſappointment more intenſely felt; and correctneſs of rhime and of meaſure will of courſe be the more indiſpenſible. In our tongue, rhime is more neceſſary to Lyric than to Heroic poetry. The reaſon ſeems to be, that in the latter the ear can of itſelf perceive the boundary of the meaſure, becauſe the lines are all of equal length nearly, and every good reader makes a ſhort pauſe at the end of each; whereas, in the former, the lines vary in length: and therefore the rhime is requiſite to make the meaſure and rhythm ſufficiently perceptible. Cuſtom too may have ſome influence. Engliſh Odes without rhime are uncommon; and therefore have ſomething aukward about them, or ſomething at leaſt to which the public ear is not yet thoroughly reconciled. Indeed, when the drama is excepted, we do not think that rhime can be ſafely ſpared from Engliſh poetry of any kind, but when the ſubject is able to ſupport itſelf. "He that thinks himſelf capable of aſtoniſhing (ſays Johnſon) may write blank verſe; but thoſe that hope only to pleaſe, muſt condeſcend to rhime."

70
In what caſes rhime may be diſpenſed with in Engliſh poetry.

Rhime, however, is of leſs importance by far than rhythm, which in poetry as well as in muſic is the ſource of much pleaſing variety; of variety tempered with uniformity, and regulated by art; inſomuch that, notwithſtanding the likeneſs of one hexameter verſe to another, it is not common, either in Virgil or Homer, to meet with two contiguous hexameters whoſe rhythm is exactly the ſame. And though all Engliſh heroic verſes conſiſt of five feet, among which the iambic predominates; yet this meaſure, in reſpect of rhythm alone, is ſuſceptible of more than 30 varieties. And let it be remarked further, that different kinds of verſe, by being adapted to different ſubjects and modes of writing, give variety to the poetic language, and multiply the charms of this pleaſing art.

What has formerly been ſhown to be true in regard to ſtyle, will alſo in many caſes hold true of verſification, "that it is then *natural* when it is adapted to the *ſuppoſed condition* of the ſpeaker."—In the epopee the poet aſſumes the character of calm inſpiration; and therefore his language muſt be elevated, and his numbers majeſtic and uniform. A peaſant ſpeaking in heroic or hexameter verſe is no improbability here; becauſe his words are ſuppoſed to be tranſmitted by one who will of his own accord give them every ornament neceſſary to reduce them into dignified meaſure; as an eloquent man, in a ſolemn aſſembly, recapitulating the ſpeech of a clown, would naturally expreſs it in pure and perſpicuous language. The uniform heroic meaſure will ſuit any ſubject of dignity, whether narrative or didactic, that admits or requires uniformity of ſtyle. In tragedy, where the imitation of real life is more perfect than in epic poetry, the uniform magnificence of epic numbers might be improper; becauſe the heroes and heroines are ſuppoſed to ſpeak in their own perſons, and according to the immediate impulſe of paſſion and ſentiment. Yet, even in tragedy, the verſification may be both harmonious and dignified; becauſe the characters are taken chiefly from high life, and the events from a remote period; and becauſe the higher poetry is permitted to imitate nature, not as it is, but in that ſtate of perfection in which it might be. The Greeks and Romans conſidered their hexameter as too artificial for dramatic poetry; and therefore in tragedy, and even in comedy, made uſe of the iambic, and ſome other meaſures that came near the cadence of converſation: we uſe the iambic both in the epic and dramatic poem; but for the moſt part it is, or ought to be, much more elaborate in the former than in the latter. In dramatic comedy, where the manners and concerns of familiar life are exhibited, verſe would ſeem to be unnatural, except it be ſo like the ſound of common diſcourſe as to be hardly diſtinguiſhable from it. Cuſtom, however, may in ſome countries determine otherwiſe; and againſt cuſtom, in theſe matters, it is vain to argue. The profeſſed enthuſiaſm of the dithyrambic poet renders wildneſs, variety, and a ſonorous harmony of numbers, peculiarly ſuitable to his odes. The love-ſonnet, and Anacreontic ſong, will be leſs various, more regular, and of a ſofter harmony; becauſe the ſtate of mind expreſſed in it has more compoſure. Philoſophy can ſcarce go further in this inveſtigation, without deviating into whim and hypotheſis. The particular ſorts of verſe to be adopted in the lower ſpecies of poetry, are determined by faſhion chiefly, and the practice of approved authors.

71
The language of the epic poet muſt be elevated and his numbers uniformly majeſtic.

72
In tragedy the ſame uniform magnificence would be improper, and much more ſo in comedy.

III. The origin and principles of *imitative harmony*, or of that artifice by which the ſound is made, as Pope ſays, "an echo to the ſenſe," may be explained in the following manner.

73
A ſtriking analogy between moral and material beauty and deformity.

It is pleaſing to obſerve the uniformity of nature in all her operations. Between moral and material beauty and harmony, between moral and material deformity and diſſonance, there obtains a very ſtriking analogy. The viſible and audible expreſſions of almoſt every virtuous emotion are agreeable to the eye and the ear, and thoſe of almoſt every criminal paſſion diſagreeable. The looks, the attitudes, and the vocal ſounds, natural to benevolence, to gratitude, to compaſſion, to piety, are in themſelves graceful and pleaſing; while anger, diſcontent, deſpair, and cruelty, bring diſcord to the voice, deformity to the features, and diſtortion to the limbs. That flowing curve, which painters know to be eſſential to the beauty of animal ſhape, gives place to a multiplicity

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tiplicity of right lines and sharp angles in the countenance and gesture of him who knits his brows, stretches his nostrils, grinds his teeth, and clenches his fiſt; whereas, devotion, magnanimity, benevolence, contentment, and good-humour, ſoften the attitude, and give a more graceful ſwell to the outline of every feature. Certain vocal tones accompany certain mental emotions. The voice of ſorrow is feeble and broken, that of deſpair boiſterous and incoherent; joy aſſumes a ſweet and ſprightly note, fear a weak and tremulous cadence: the tones of love and benevolence are muſical and uniform, thoſe of rage loud and diſſonant; the voice of the ſedate reaſoner is equable and grave, but not unpleaſant; and he who declaims with energy, employs many varieties of modulation ſuited to the various emotions that predominate in his diſcourſe.

But it is not in the language of paſſion only that the human voice varies its tone, or the human face its features. Every ſtriking ſentiment, and every intereſting idea, has an effect upon it. One would eſteem that perſon no adept in narrative eloquence, who ſhould deſcribe, with the very ſame accent, ſwift and ſlow motion, extreme labour and eaſy performance, agreeable ſenſation and excruciating pain; who ſhould talk of the tumult of a tempeſtuous ocean, the roar of thunder, the devaſtations of an earthquake, or an Egyptian pyramid tumbling into ruins, in the ſame tone of voice wherewith he deſcribes the murmur of a rill, the warbling of the harp of Æolus, the ſwinging of a cradle, or the deſcent of an angel. Elevation of mind gives dignity to the voice. From Achilles, Sarpedon, and Othello, we ſhould as naturally expect a manly and ſonorous accent, as a nervous ſtyle and majeſtic attitude. Coxcombs and bullies, while they aſſume airs of importance and valour, affect alſo a dignified articulation.

74
The ſource of imitative harmony of numbers.

Since the tones of natural language are ſo various, poetry, which imitates the language of nature, muſt alſo vary its tones; and, in reſpect of ſound as well as of meaning, be framed after that model of ideal perfection, which the variety and energy of the human articulate voice render probable. This is the more eaſily accompliſhed, becauſe in every language there is between the ſound and ſenſe of certain words a perceptible analogy; which, though not ſo accurate as to lead a foreigner from the ſound to the ſignification, is yet accurate enough to ſhow, that, in forming ſuch words, regard has been had to the imitative qualities of vocal ſound. Such, in Engliſh, are the words *yell*, *craſh*, *crack*, *hiſs*, *roar*, *murmur*, and many others.

All the particular laws that regulate this ſort of imitation, as far as they are founded in nature, and liable to the cognizance of philoſophy, depend on the general law of ſtyle above mentioned. Together with the other circumſtances of the ſuppoſed ſpeaker, the poet takes into conſideration the tone of voice ſuitable to the ideas that occupy his mind, and thereto adapts the ſound of his language, if it can be done conſiſtently with eaſe and elegance of expreſſion. But when this imitative harmony is too much ſought after, or words appear to be choſen for ſound rather than ſenſe, the verſe becomes finical and ridiculous. Such is Ronſard's affected imitation of the ſong of the ſky-lark:

> Elle quindée du zephire
> Sublime en l'air vire et revire,
> Et y declique un joli cris,
> Qui rit, guérit, et tire l'ire
> Des eſprit mieux que je n'écris.

This is as ridiculous as that line of Ennius,

> Tum tuba terribili ſonitu taratantara dixit:

Or as the following verſes of Swift;

> The man with the kettle-drum enters the gate,
> Dub dub a dub dub: the trumpeters follow,
> Tantara tantara; while all the boys hollow.

75
What harmony of numbers can imitate.

Words by their ſound may imitate ſound; and quick or ſlow articulation may imitate quick or ſlow motion. Hence, by a proper choice and arrangement of words, the poet may imitate *Sounds* that are ſweet with dignity (H),—ſweet and tender (I),—loud (K),—and harſh (L);—and *Motions* that are ſlow, in conſequence of dignity (M),—ſlow in conſequence of difficulty (N), ſwift

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(H) No ſooner had th' Almighty ceas'd, than all
The multitude of angels, with a ſhout
Loud as from numbers without number, ſweet
As from bleſt voices uttering joy; heav'n rung
With jubilee, and loud hoſannas fill'd
Th' eternal regions.—— *Par. Loſt*, iii.

See alſo the night-ſtorm of thunder, lightning, wind, and rain, in Virg. Georg. lib. i. ver. 328—334.

(I) Et longum, formoſe, vale, vale, inquit, Iola.
Virg. Ecl. i.

Formoſam reſonare doces Amaryllida ſilvas.
Virg. Ecl. i.

See alſo the ſimile of the nightingale, Georg. lib. iv. verſ. 511. And ſee that wonderful couplet deſcribing the wailings of the owl, Æneid iv. 462.

(K)——————vibratus ab æthere fulgor
Cum ſonitu venit, et ruere omnia viſa repente,
Tyrrhenuſque tubæ mugire per æthera clangor,
Suſpiciunt: iterum atque iterum fragor increpat
ingens. *Æneid* viii.

See alſo the ſtorm in the firſt book of the Æneid, and in the fifth of the Odyſſey.

(L) The hoarſe rough verſe ſhould like the torrent roar.
Pope.

————On a ſudden open fly,
With impetuous recoil and jarring ſound,
Th' infernal doors, and on their hinges grate
Harſh thunder.—— *Par. Loſt*, ii. 879.

See alſo Homer's Iliad, lib. ii. ver. 363, and Clarke's Annotation.

(M) See an exquiſite example in Gray's Progreſs of Poeſy; the concluſion of the third ſtanza.

(N) And when up ten ſteep ſlopes you've dragg'd
your thighs. *Pope.*

Juſt brought out this, when ſcarce his tongue could
ſtir. *Pope.*

————The huge leviathan
Wallowing unwieldy, enormous in their gait,
Tempeſt the ocean. *Par. Loſt*, vii. 411.

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ſwift and noiſy (O)—ſwift and ſmooth (P)—uneven and abrupt (Q),—quick and joyous (R). An unexpected pauſe in the verſe may alſo imitate a ſudden failure of ſtrength (S), or interruption of motion (T), or give vivacity to an image or thought, by fixing our attention longer than uſual upon the word that precedes it (U).—Moreover, when we deſcribe great bulk, it is natural for us to articulate ſlowly, even in common diſcourſe; and therefore a line of poetry that requires a ſlow pronunciation, or ſeems longer than it ſhould be, may be uſed with good effect in deſcribing vaſtneſs of ſize (X).—Sweet and ſmooth numbers are moſt proper, when the poet paints agreeable objects, or gentle energy (Y); and harſher ſounds when he ſpeaks of what is ugly, violent, or diſagreeable (Z). This too is according to the nature of common language; for we generally employ harſher tones of voice to expreſs what we diſlike, and more melodious notes to deſcribe the objects of love, complacency, or admiration. Harſh numbers, however, ſhould not be frequent in poetry: for in this art, as in muſic, concord and melody ought always to predominate. And we find in fact, that good poets can occaſionally expreſs themſelves ſomewhat harſhly, when the ſubject requires it, and yet preſerve the ſweetneſs and majeſty of poetical diction. Further, the voice of complaint, pity, love, and all the gentler affections, is mild and muſical, and ſhould therefore be imitated in muſical numbers; while deſpair, defiance, revenge, and turbulent emotions in general, aſſume an abrupt and ſonorous cadence. Dignity of deſcription (A), ſolemn vows (B), and all ſentiments that proceed from a mind elevated with great ideas (C), require a correſpon-

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See the famous deſcription of Siſyphus rolling the ſtone, Odyſſ. lib. xi. ver. 592. See Quintil. Inſt. Orat. lib. ix. cap. 4. § 4. compared with Paradiſe Loſt, book ii. ver. 1022.

(O) Quadrupedante putrem ſonitu quatit ungula
campum. *Æneid.*

Αυταρ επειτα πεδονδε κυλινδετο λαος αναιδης. *Odyſſ.* xi.

See alſo Virg. Æneid. lib. i. ver. 83—87.

(P) See wild as the winds o'er the deſert he flies.
Pope.

Ille volat, ſimul arva fuga, ſimul æquora verrens.
Virg.

Ρηιδιη τ' επειτα πελει, χαλεπη πηρ εουσα. *Heſiod.*

(Q) Πολλα δ' αναντα καταντα παραντα τε δοχμια τ' ηλθον.
Hom.

The laſs ſhriek'd, ſtarted up, and ſhriek'd again,
Anonym.

(R) Let the merry bells ring round,
And the jocund rebecks ſound,
To many a youth, and many a maid,
Dancing in the chequer'd ſhade. *Milt. Allegro.*

See alſo Gray's Progreſs of Poeſy, ſtanza 3.

(S) Ac velut in ſomnis oculos ubi languida preſſit
Nocte quies, nequicquam avidos extendere curſus
Velle videmur:—et in mediis conatibus ægri
Succidimus.—— *Æneid.*

See alſo Virg. Georg. lib. iii. ver. 515, 516.

(T) For this, be ſure to-night thou ſhalt have cramps,
Side-ſtitches that ſhall pen thy breath up. Urchins
Shall exerciſe upon thee.——
Proſpero to Calyban in *the Tempeſt.*

See Pope's Iliad, xiii. 199.

(U) ———How often from the ſteep
Of echoing hill or thicket have we heard
Celeſtial voices, to the midnight air,
Sole,—or reſponſive to each other's note,
Singing their great Creator?——*Par. Loſt,* iv.

And over them triumphant Death his dart
Shook,——but delay'd to ſtrike. *Id.*

See alſo Hom. Odyſſ. lib. ix. ver. 290.

(X) Thus ſtretch'd out, huge in length, the arch fiend
lay. *Par. Loſt.*

Monſtrum horrendum, informe, ingens, cui lumen
ademptum. *Æneid.* iii.

Et magnos membrorum artus, magna oſſa, lacertoſque
Exuit, atque ingens media conſiſtit arena.
Æneid. v. 422.

(Y) Hic gelidi fontes, hic mollia prata, Lycori,
Hic nemus, hic ipſo tecum conſumerer ævo.
Virg. Ecl. x.

The dumb ſhall ſing; the lame his crutch forego,
And leap, exulting, like the bounding roe.
Pope's Meſſiah.

See Milton's deſcription of the evening, Par. Loſt, book iv. ver. 598—609.

Ye gentle gales beneath my body blow,
And ſoftly lay me on the waves below.
Pope's Sappho.

(Z) Stridenti ſtipula miſerum diſperdere carmen.
Virg. Ecl. iii.

Immo ego Sardois videar tibi amarior herbis,
Horridior ruſco, projecta vilior alga.
Virg. Ecl. vii.

Neu patriæ validas in viſcera vertite vires.
Virg. Æneid. vi.

See alſo Milton's deſcription of the Lazar-houſe in Paradiſe Loſt, book xi. ver. 477—492.

(A) See Virg. Georg. l. 328. and Homer, Virgil, and Milton, *paſſim.* See alſo Dryden's Alexander's Feaſt, and Gray's Odes.

(B) See Virg. Æneid, iv. 24.

(C) Examples are frequent in the great authors. See Othello's exclamation:

————O now for ever
Farewell the tranquil mind! &c. *Act* iii. *ſc.* 3.

Of Poetical Harmony.

correſpondent pomp of language and verſification.—Laſtly, an irregular or uncommon movement in the verſe may ſometimes be of uſe, to make the reader conceive an image in a particular manner. Virgil, deſcribing horſes running over rocky heights at full ſpeed, begins the line with two dactyls, to imitate rapidity, and concludes it with eight long ſyllables:

> Saxa per, et ſcopulos, et depreſſas convalles.
> *Georg.* iii. 276.

which is very unuſual meaſure, but ſeems well adapted to the thing expreſſed, namely, to the deſcent of the animal from the hills to the low ground. At any rate, this extraordinary change of the rhythm may be allowed to bear ſome reſemblance to the animal's change of motion, as it would be felt by a rider, and as we may ſuppoſe it felt by the animal itſelf.

Other forms of imitative harmony, and many other examples, beſides thoſe referred to in the margin, will readily occur to all who are converſant in the writings of the beſt verſifiers, particularly Homer, Virgil, Milton, Lucretius, Spenſer, Dryden, Shakeſpeare, Pope, and Gray.

PART II. OF THE DIFFERENT SPECIES OF POETRY, with their PARTICULAR PRINCIPLES.

SECT. I. *Of Epic and Dramatic Compoſitions.*

§ 1. *The Epopee and Drama compared.*

Elem. of Criticiſm.

76
In what tragic and epic poetry agree, and in what they differ.

TRAGEDY and the epic differ not in ſubſtantials in both the ſame ends are propoſed, viz. inſtruction and amuſement; and in both the ſame mean is employed, viz. imitation of human actions. They differ only in the manner of imitating; epic poetry employs narration; tragedy repreſents its facts as paſſing in our ſight: in the former, the poet introduces himſelf as an hiſtorian; in the latter, he preſents his actors, and never himſelf.

This difference, regarding form only, may be thought ſlight: but the effects it occaſions are by no means ſo; for what we ſee makes a deeper impreſſion than what we learn from others. A narrative poem is a ſtory told by another: facts and incidents paſſing upon the ſtage, come under our own obſervation; and are beſide much enlivened by action and geſture, expreſſive of many ſentiments beyond the reach of language.

A dramatic compoſition has another property, independent altogether of action; which is, that it makes a deeper impreſſion than narration: in the former, perſons expreſs their own ſentiments; in the latter, ſentiments are related at ſecond-hand. For that reaſon, Ariſtotle, the father of critics, lays it down as a rule *, That in an epic poem the author ought to take every opportunity of introducing his actors, and of confining the narrative part within the narroweſt bounds. Homer underſtood perfectly the advantage of this method; and his poems are both of them in a great meaſure dramatic. Lucan runs to the oppoſite extreme: and is guilty of a ſtill greater fault, in ſtuffing his *Pharſalia* with cold and languid reflections, the merit of which he aſſumes to himſelf, and deigns not to ſhare with his actors. Nothing can be more injudiciouſly timed, than a chain of ſuch reflections, which ſuſpend the battle of Pharſalia, after the leaders had made their ſpeeches, and the two armies are ready to engage †.

77
Tragic and epic poetry pathetic or moral.

Ariſtotle, from the nature of the fable, divides tragedy into ſimple and complex: but it is of greater moment, with reſpect to dramatic as well as epic poetry, to found a diſtinction upon the different ends attained by ſuch compoſitions. A poem, whether dramatic or epic, that has nothing in view but to move the paſſions and to exhibit pictures of virtue and vice, may be diſtinguiſhed by the name of *pathetic*: but where a ſtory is purpoſely contrived to illuſtrate ſome moral truth, by ſhowing that diſorderly paſſions naturally lead to external misfortunes, ſuch compoſition may be denominated *moral*. Beſide making a deeper impreſſion than can be done by cool reaſoning, a moral poem does not fall ſhort of reaſoning in affording conviction: the natural connection of vice with miſery, and of virtue with happineſs, may be illuſtrated by ſtating a fact as well as by urging an argument. Let us aſſume, for example, the following moral truths: That diſcord among the chiefs renders ineffectual all common meaſures; and that the conſequences of a ſlightly-founded quarrel, foſtered by pride and arrogance, are not leſs fatal than thoſe of the groſſeſt injury: theſe truths may be inculcated by the quarrel between Agamemnon and Achilles at the ſiege of Troy. If facts or circumſtances be wanting, ſuch as tend to rouſe the turbulent paſſions, they muſt be invented; but no accidental nor unaccountable event ought to be admitted; for the neceſſary or probable connection between vice and miſery is not learned from any events but what are naturally occaſioned by the characters and paſſions of the perſons repreſented, acting in ſuch circumſtances. A real event, of which we ſee not the cauſe, may afford a leſſon, upon the preſumption that what hath happened may again happen: but this cannot be inferred from a ſtory that is known to be a fiction.

78
The good effects of ſuch compoſitions.

Many are the good effects of ſuch compoſitions. A pathetic compoſition, whether epic or dramatic, tends to a habit of virtue, by exciting us to do what is right, and reſtraining us from what is wrong. Its frequent pictures of human woes produce, beſide, two effects, extremely ſalutary: They improve our ſympathy, and fortify us to bear our misfortunes. A moral compoſition muſt obviouſly produce the ſame good effects becauſe by being moral it ceaſeth not to be pathetic: it enjoys beſides an excellence peculiar to itſelf; for it not only improves the heart, as above-mentioned, but inſtructs the head by the moral it contains. It ſeems impoſſible to imagine any entertainment more ſuited to a rational being, than a work thus happily illuſtrating ſome moral truth; where a number of perſons of different characters are engaged in an important action, ſome retarding, others promoting, the great cataſtrophe; and where there is dignity of ſtyle as well as of matter. A work of this kind has our ſympathy at command, and can put in motion the whole train of the ſocial affections: our curioſity in ſome ſcenes is excited, in others gratified; and our delight is conſummated at the cloſe, upon finding, from the characters and ſituations exhibited at the commencement, that every incident down to the final cataſtrophe is natural, and that the whole in conjunction make a regular chain of cauſes and effects.

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* Poet. chap 25. ſect. 6.

† Lib. vii. from line 385 to line 460.

79
The ſame ſubjects not always fit for tragic and epic poetry.

Conſidering that an epic and a dramatic poem are the ſame in ſubſtance, and have the ſame aim or end, one will readily imagine, that ſubjects proper for the one muſt be equally proper for the other. But conſidering their difference as to form, there will be found reaſon to correct that conjecture, at leaſt in ſome degree. Many ſubjects may indeed be treated with equal advantage in either form: but the ſubjects are ſtill more numerous for which they are not equally qualified; and there are ſubjects proper for the one and not at all for the other. To give ſome ſlight notion of the difference, as there is no room here for enlarging upon every article, we obſerve, that dialogue is better qualified for expreſſing ſentiments, and narrative for diſplaying facts. Heroiſm, magnanimity, undaunted courage, and other elevated virtues, figure beſt in action: tender paſſions, and the whole tribe of ſympathetic affections, figure beſt in ſentiment. It clearly follows, that tender paſſions are more peculiarly the province of tragedy, grand and heroic actions of epic poetry.

"The epic poem is univerſally allowed to be *, of all poetical works, the moſt dignified, and, at the ſame time, the moſt difficult in execution. To contrive a ſtory which ſhall pleaſe and intereſt all readers, by being at once entertaining, important, and inſtructive; to fill it with ſuitable incidents; to enliven it with a variety of characters and of deſcriptions; and, throughout a long work, to maintain that propriety of ſentiment, and that elevation of ſtyle, which the epic character requires, is unqueſtionably the higheſt effort of poetical genius.

80
The proper ſubject of an epic poem.

"The action or ſubject of the epic poem muſt be great and intereſting. Without greatneſs it would not have ſufficient importance either to fix our attention or to juſtify the magnificent apparatus which the poet beſtows on it. This is ſo evidently requiſite as not to require illuſtration; and, indeed, hardly any who have attempted epic poetry have failed in chooſing ſome ſubject ſufficiently important, either by the nature of the action or by the fame of the perſonages concerned in it. The fame of Homer's heroes, and the conſequences of diſſenſion between the greateſt of them, is a ſubject important in itſelf, and muſt have appeared particularly ſo to his countrymen, who boaſted their deſcent from thoſe heroes. The ſubject of the Æneid is ſtill greater than that of the Iliad, as it is the foundation of the moſt powerful empire that ever was eſtabliſhed upon this globe; an event of much greater importance than the deſtruction of a city, or the anger of a ſemibarbarous warrior. But the poems of Homer and Virgil fall in this reſpect infinitely ſhort of that of Milton. 'Before the greatneſs diſplayed in Paradiſe Loſt, it has been well obſerved § that all other greatneſs ſhrinks away. The ſubject of the Engliſh poet is not the deſtruction of a city, the conduct of a colony, or the foundation of an empire: it is the fate of worlds, the revolutions of heaven and earth; rebellion againſt the Supreme King, raiſed by the higheſt order of created beings; the overthrow of their hoſt, and the puniſhment of their crime; the creation of a new race of reaſonable creatures; their original happineſs and innocence, their forfeiture of immortality, and their reſtoration to hope and peace."

An epic poem, however, is defective if its action be not intereſting as well as great; for a narrative of mere valour may be ſo conſtructed as to prove cold and tireſome. "Much * will depend on the happy choice of ſome ſubject, which ſhall by its nature intereſt the public; as when the poet ſelects for his hero one who is the founder, or the deliverer, or the favourite of his nation; or when he writes atchievements that have been highly celebrated, or have been connected with important conſequences to any public cauſe. Moſt of the great epic poems are abundantly fortunate in this reſpect, and muſt have been very intereſting to thoſe ages in which they were compoſed." The ſubject of the Paradiſe Loſt, as it is infinitely greater, muſt likewiſe be conſidered as more univerſally intereſting than that of any other poem. "We all feel the effects of Adam's tranſgreſſion; we all ſin like him, and like him muſt all bewail our offences. We have reſtleſs and inſidious enemies in the fallen angels, and in the bleſſed ſpirits we have guardians and friends; in the redemption of mankind we hope to be included; in the deſcription of heaven and hell we are ſurely intereſted, as we are all to reſide hereafter either in the regions of horror or bliſs."

81
Circumſtances chiefly intereſting in epic poetry.

"The chief circumſtance which renders an epic poem intereſting †, and which tends to intereſt not one age or country alone, but all readers, is the ſkilful conduct of the author in the management of his ſubject. His plan muſt comprehend many affecting incidents. He may ſometimes be awful and auguſt; he muſt often be tender and pathetic; he muſt give us gentle and pleaſing ſcenes of love, friendſhip, and affection. The more that an epic poem abounds with ſituations which awaken the feelings of humanity, it is the more intereſting. In this reſpect perhaps no epic poets have been ſo happy as Virgil and Taſſo. The plan of the *Paradiſe Loſt* compriſes neither human actions nor human manners. The man and woman who act and ſuffer, are in a ſtate which no other man or woman can ever know. The reader finds no tranſaction in which he can be engaged; beholds no condition in which he can by any effort of imagination place himſelf; he has therefore little natural curioſity or ſympathy."

82
Whether the hero muſt neceſſarily be ſucceſsful.

A queſtion has been moved, Whether the nature of the epic poem does not require that the hero ſhould be ultimately ſucceſsful? To this queſtion Johnſon replies, that "there is no reaſon why the hero ſhould not be unfortunate, except eſtabliſhed practice, ſince ſucceſs and virtue do not neceſſarily go together." Moſt critics, however, are of a different opinion, and hold ſucceſs to be, if not the neceſſary, at leaſt the moſt proper iſſue of an epic poem. An unhappy concluſion depreſſes the mind, and is oppoſite to the elevating emotions which belong to this ſpecies of poetry. Terror and compaſſion are the proper ſubjects of tragedy; but as the epic is of larger extent, it were too much, if, after the difficulties and troubles which commonly abound in the progreſs of the poem, the author ſhould bring them all at laſt to an unfortunate concluſion. We know not that any author of name has held this courſe except *Lucan*; for in the *Paradiſe Loſt*, as Adam's deceiver is at laſt cruſhed, and he himſelf reſtored to the favour of his maker, Milton's hero muſt be conſidered as finally ſucceſsful.

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* *Blair's Lectures.*

§ *Johnſon's Life of Milton.*

* *Blair ubi ſupra.*

† *Blair and Johnſon.*

Of the Epopee and Drama.

Of the Epopee and Drama.

We have no occaſion to ſay more of the epic, conſidered as peculiarly adapted to certain ſubjects, and to be conducted according to a certain plan. But as dramatic ſubjects are more complex, it is neceſſary to take a narrower view of them. They are either the light and the gay, or the grave and affecting, incidents of human life. The former conſtitute the ſubject of comedy, and the latter of tragedy.

As great and ſerious objects command more attention than little and ludicrous ones; as the fall of a hero intereſts the public more than the marriage of a private perſon; tragedy has been always held a more dignified entertainment than comedy. The firſt thing required of the tragic poet is, that he pitch upon ſome moving and intereſting ſtory, and that he conduct it in a natural and probable manner. For we muſt obſerve, that the natural and probable are more eſſential to tragic than even to epic poetry. Admiration is excited by the wonderful; but paſſion can be raiſed only by the impreſſions of nature and truth upon the mind.

84
Subjects beſt ſuited to tragedy.

The ſubject beſt fitted for tragedy is where a man has himſelf been the cauſe of his misfortune; not ſo as to be deeply guilty, nor altogether innocent: the misfortune muſt be occaſioned by a fault incident to human nature, and therefore in ſome degree venial. Such misfortunes call forth the ſocial affections, and warmly intereſt the ſpectator. An accidental misfortune, if not extremely ſingular, doth not greatly move our pity: the perſon who ſuffers, being innocent, is freed from the greateſt of all torments, that anguiſh of mind which is occaſioned by remorſe. An atrocious criminal, on the other hand, who brings misfortunes upon himſelf, excites little pity, for a different reaſon: his remorſe, it is true, aggravates his diſtreſs, and ſwells the firſt emotions of pity: but then our hatred of him as a criminal blending with pity, blunts its edge conſiderably. Misfortunes that are not innocent, nor highly criminal, partake the advantages of each extreme: they are attended with remorſe to embitter the diſtreſs, which raiſes our pity to a great height; and the ſlight indignation we have at a venial fault detracts not ſenſibly from our pity. The happieſt of all ſubjects accordingly for raiſing pity, is where a man of integrity falls into a great misfortune by doing an action that is innocent, but which, by ſome ſingular means, is conceived by him to be criminal: his remorſe aggravates his diſtreſs; and our compaſſion, unreſtrained by indignation, knows no bounds. Pity comes thus to be the ruling paſſion of a pathetic tragedy; and, by proper repreſentation, may be raiſed to a height ſcarcely exceeded by any thing felt in real life. A moral tragedy takes in a larger field; as it not only exerciſes our pity, but raiſes another paſſion, which, though ſelfiſh, deſerves to be cheriſhed equally with the ſocial affection. The paſſion we have in view is fear or terror; for when a misfortune is the natural conſequence of ſome wrong bias in the temper, every ſpectator who is conſcious of ſuch a bias in himſelf takes the alarm, and dreads his falling into the ſame misfortune: and by the emotion of fear or terror, frequently reiterated in a variety of moral tragedies, the ſpectators are put upon their guard againſt the diſorders of paſſion.

The commentators upon Ariſtotle, and other critics, have been much gravelled about the account given of tragedy by that author: "That by means of pity and terror, it refines or purifies in us all ſorts of paſſion." But no one who has a clear conception of the end and effects of a good tragedy, can have any difficulty about Ariſtotle's meaning: Our pity is engaged for the perſons repreſented; and our terror is upon our own account. Pity indeed is here made to ſtand for all the ſympathetic emotions, becauſe of theſe it is the capital. There can be no doubt, that our ſympathetic emotions are refined or improved by daily exerciſe; and in what manner our other paſſions are refined by terror, has been juſt now ſaid. One thing is certain, that no other meaning can juſtly be given to the foregoing doctrine than that now mentioned; and that it was really Ariſtotle's meaning, appears from his 13th chapter, where he delivers ſeveral propoſitions conformable to the doctrine here explained. Theſe, at the ſame time, we take liberty to mention; becauſe, ſo far as authority can go, they confirm the foregoing reaſoning about ſubjects proper for tragedy. The firſt propoſition is, That it being the province of tragedy to excite pity and terror, an innocent perſon falling into adverſity ought never to be the ſubject. This propoſition is a neceſſary conſequence of his doctrine as explained; a ſubject of that nature may indeed excite pity and terror; but the former in an inferior degree, and the latter in no degree for moral inſtruction. The ſecond propoſition is, That the hiſtory of a wicked perſon in a change from miſery to happineſs ought not to be repreſented; which excites neither terror nor compaſſion, nor is agreeable in any reſpect. The third is, That the misfortunes of a wicked perſon ought not to be repreſented: ſuch repreſentation may be agreeable in ſome meaſure upon a principle of juſtice; but it will not move our pity, or any degree of terror, except in thoſe of the ſame vicious diſpoſition with the perſon repreſented. The laſt propoſition is, That the only character fit for repreſentation lies in the middle, neither eminently good nor eminently bad; where the misfortune is not the effect of deliberate vice, but of ſome involuntary fault, as our author expreſſes it. The only objection we find to Ariſtotle's account of tragedy, is, that he confines it within too narrow bounds, by refuſing admittance to the pathetic kind: for if terror be eſſential to tragedy, no repreſentation deſerves that name but the moral kind, where the misfortunes exhibited are cauſed by a wrong balance of mind, or ſome diſorder in the internal conſtitution: ſuch misfortunes always ſuggeſt moral inſtruction; and by ſuch misfortunes only can terror be excited for our improvement.

Thus Ariſtotle's four propoſitions above-mentioned relate ſolely to tragedies of the moral kind. Thoſe of the pathetic kind are not confined within ſo narrow limits: ſubjects fitted for the theatre are not in ſuch plenty as to make us reject innocent misfortunes which rouſe our ſympathy, though they inculcate no moral. With reſpect indeed to the ſubjects of that kind, it may be doubted, whether the concluſion ought not always to be fortunate. Where a perſon of integrity is repreſented as ſuffering to the end under misfortunes purely accidental, we depart diſcontented, and with ſome obſcure ſenſe of injuſtice: for ſeldom is man ſo ſubmiſſive to Providence, as not to revolt againſt the tyranny and vexations of blind chance; he will be tempted to ſay, this ought not to be. We give for an example the *Romeo and Juliet* of Shakeſpeare, where the fatal cataſtrophe is occaſioned by Friar Lawrence's coming to the monument a minute too late; we are vexed at the unlucky chance, and go away diſſatisfied. Such impreſſions, which ought not to be cheriſhed, are a ſufficient reaſon for excluding ſtories of this kind from the theatre.

85
The improper uſe of deſtiny in the ancient tragedies.

The misfortunes of a virtuous perſon, ariſing from neceſſary cauſes, or a chain of unavoidable circumſtances, as they excite a notion of deſtiny, are equally unſatisfactory to the human mind. A metaphyſician in his cloſet may reaſon himſelf into the belief of fate, or what in modern language is called *philoſophical neceſſity*; but the feelings of the heart revolt againſt that doctrine; and we have the confeſſion of the two ableſt philoſophers by whom it was ever maintained, that men conduct themſelves through life as if their will were abſolutely free, and their actions no part of a chain of neceſſary cauſes and effects. As no man goes to the theatre to ſtudy metaphyſics, or to diveſt himſelf of the common feelings of humanity, it is impoſſible, whatever be his philoſophical creed, that he ſhould contemplate without horror and diſguſt an innocent perſon ſuffering by mere deſtiny. A tragedy of uncommon merit in every other reſpect may indeed be endured, nay perhaps admired, though ſuch be its cataſtrophe; becauſe no work of man was ever perfect; and becauſe, where imperfections are unavoidable, a multitude of excellencies may be allowed to cover one fault: but we believe the miſery of an innocent perſon reſulting from a chain of unavoidable circumſtances has never been conſidered as a beauty by minds unperverted by a falſe philoſophy. "It muſt be acknowledged * that the ſubjects of the ancient Greek tragedies were frequently founded on mere deſtiny and inevitable misfortunes. In the courſe of the drama many moral ſentiments occurred; but the only inſtruction which the fable conveyed was, that reverence was due to the gods, and ſubmiſſion to the decrees of fate. Modern tragedy has aimed at a higher object, by becoming more the theatre of paſſion; pointing out to men the conſequences of their own miſconduct, ſhowing the direful effects which ambition, jealouſy, love, reſentment, and other ſuch ſtrong emotions, when miſguided or left unreſtrained, produce upon human life. An Othello, hurried by jealouſy to murder his innocent wife; a Jaffier enſnared by reſentment and want to engage in a conſpiracy, and then ſtung with remorſe and involved in ruin; a Siffredi, through the deceit which he employs for public-ſpirited ends, bringing deſtruction on all whom he loved: theſe, and ſuch as theſe, are the examples which Tragedy now diſplays to public view; and by means of which it inculcates on men the proper government of their paſſions."

* Blair.

86
How it is uſed in the tragedy of the Robbers.

There is indeed one ſingular drama, in which deſtiny is employed in a manner very different from that in which it was uſed by the poets of Greece and Rome. It is Schiller's tragedy of the Robbers, of which "the hero endowed by nature (as the tranſlator of the piece obſerves) with the moſt generous feelings, animated by the higheſt ſenſe of honour, and ſuſceptible of the warmeſt affections of the heart, is driven by the perfidy of a brother, and the ſuppoſed inhumanity of his father, into a ſtate of confirmed miſanthropy and deſpair." He wiſhes that he "could blow the trumpet of rebellion through all nature; that he could extinguiſh with one mortal blow the viperous race of men; and that he could ſo ſtrike as to deſtroy the germ of exiſtence." In this ſituation he is hurried on to the perpetration of a ſeries of crimes which find from their very magnitude and atrocity a recommendation to his diſtempered mind: Senſible all the while of his own guilt, and ſuffering for that guilt the ſevereſt pangs of remorſe, he yet believes himſelf an inſtrument of vengeance in the hands of the Almighty for the puniſhment of the crimes of others. In thus accompliſhing the dreadful deſtiny which is preſcribed for him, he feels a ſpecies of gloomy ſatisfaction, at the ſame time that he conſiders himſelf as doomed to the performance of that part in life which is to conſign his memory to infamy and his ſoul to perdition. After burning a town, he exclaims, "O God of vengeance! am I to blame for this? Art thou to blame, O Father of Heaven! when the inſtruments of thy wrath, the peſtilence, flood, and famine overwhelm at once the righteous and the guilty? Who can command the flames to ſtay their courſe, to deſtroy only the noxious vermin, and ſpare the fertile field?" yet with the ſame breath he acuſes himſelf of extreme criminality for "preſumptuouſly wielding the ſword of the Moſt High!" He frequently laments in the moſt affecting manner the loſs of his innocence, wiſhes that "he could return into the womb that bare him, that he hung an infant at the breaſt, that he were born a beggar, the meaneſt hind, a peaſant of the field." He conſiders himſelf as the outcaſt of Heaven, and finally rejected by the Father of mercy; yet he tells the band of robbers whom he commanded, that the "Almighty honoured them as agents in his hands to execute his wonderous purpoſes; employed them as his angels to execute his ſtern decrees, and pour the vials of his wrath;" and in a very ſolemn prayer, he ſuppoſes that "the God who ruleth over all had *decreed* that he ſhould become the chief of theſe foul murderers."

"It will be allowed, (ſays the tranſlator), that the imagination could not have conceived a ſpectacle more deeply intereſting, more powerfully affecting to the mind of man, than that of a human being thus characteriſed and acting under ſuch impreſſions. The compaſſionate intereſt which the mind feels in the emotions or ſufferings of the guilty perſon, is not diminiſhed by the obſervation, that he acts under an impreſſion of inevitable deſtiny; on the contrary, there is ſomething in our nature which leads us the more to compaſſionate the inſtrument of thoſe crimes, that we ſee him conſider himſelf as bound to guilt by fetters, which he has the conſtant wiſh, but not the ſtrength, to break."

This is indeed true: we ſympathiſe with the hero of the Robbers, not only on account of his exalted ſentiments and his inflexible regard to the abſtract principles of honour and juſtice, but much more for that diſorder of intellect which makes him *ſuppoſe* "his deſtiny fixed and unalterable," at the very time that he is torn with remorſe for the perpetration of thoſe crimes by which he believed it to be fulfilling. Deſtiny, however, is not in this tragedy exhibited as real, but merely as the phantom of a diſtempered though noble mind. Had the poet repreſented his hero as in *fact decreed by God*, or *bound by fate*, to head a band of foul murderers, and to commit a ſeries of the moſt atrocious crimes; though our pity for him might not have been leſſened, the impreſſions of the whole piece on the mind could have been only thoſe of horror and diſguſt at what would have appeared to us the unequal ways of providence.

The Tragedy of the Robbers is a ſtriking inſtance of the juſtneſs of Dr Blair's criticiſm, in oppoſition to that of Lord Kames. His lordſhip holds that it is eſſential to a good tragedy, that its principal facts be borrowed from hiſtory; becauſe a mixture of known truth with the fable tends to delude us into a conviction of the reality of the whole. The Doctor conſiders this as a matter of no great conſequence; for "it is proved by experience, that a fictitious tale, if properly conducted, will melt the heart as much as any real hiſtory;" this obſervation is verified in the Robbers. It is indeed a very irregular drama, and perhaps could not be acted on a Britiſh theatre. But although the whole is known to be a fiction, we believe there are few effuſions of human genius which more powerfully excite the emotions of terror and pity. Truth is indeed congenial to the mind; and when a ſubject proper for tragedy occurs in hiſtory or tradition, it is perhaps better to adopt it than to invent one which has no ſuch foundation. But in chooſing a ſubject which makes a figure in hiſtory, greater precaution is neceſſary than where the whole is a fiction. In the latter caſe, the author is under no reſtraint other than that the characters and incidents be juſt copies of nature. But where the ſtory is founded on truth, no circumſtances muſt be added, but ſuch as connect naturally with what are known to be true; hiſtory may be ſupplied, but muſt not be contradicted. Further, the ſubject choſen muſt be diſtant in time, or at leaſt in place; for the familiarity of recent perſons and events ought to be avoided. Familiarity ought more eſpecially to be avoided in an epic poem, the peculiar character of which is dignity and elevation: modern manners make but a poor figure in ſuch a poem. Their familiarity unqualifies them for a lofty ſubject. The dignity of them will be better underſtood in future ages, when they are no longer familiar.

87
Whether the ſubject of tragedy ſhould have its foundation in truth.

After Voltaire, no writer, it is probable, will think of rearing an epic poem upon a recent event in the hiſtory of his own country. But an event of that kind is perhaps not altogether unqualified for tragedy: it was admitted in Greece; and Shakeſpeare has employed it ſucceſsfully in ſeveral of his pieces. One advantage it poſſeſſes above fiction, that of more readily engaging our belief, which tends above any other particular to raiſe our ſympathy. The ſcene of comedy is generally laid at home: familiarity is no objection; and we are peculiarly ſenſible of the ridicule of our own manners.

88
How a tragedy ſhould be divided into acts; and how many acts it ſhould have.
Elem. of Criticiſm, ch. xxii.

After a proper ſubject is choſen, the dividing it into parts requires ſome art. The concluſion of a book in an epic poem, or of an act in a play, cannot be altogether arbitrary; nor be intended for ſo ſlight a purpoſe as to make the parts of equal length. The ſuppoſed pauſe at the end of every book, and the real pauſe at the end of every act, ought always to coincide with ſome pauſe in the action. In this reſpect, a dramatic or epic poem ought to reſemble a ſentence or period in language, divided into members that are diſtinguiſhed from each other by proper pauſes; or it ought to reſemble a piece of muſic, having a full cloſe at the end, preceded by imperfect cloſes that contribute to the melody. The diviſion of every play into *five* acts has no other foundation than common practice, and the authority of Horace (D). It is a diviſion purely arbitrary; there is nothing in the nature of the compoſition which fixes this number rather than any other; and it had been much better if no ſuch number had been aſcertained. But, ſince it is aſcertained, every act in a dramatic poem ought to cloſe with ſome incident that makes a pauſe in the action; for otherwiſe there can be no pretext for interrupting the repreſentation. It would be abſurd to break off in the very heat of action; againſt which every one would exclaim: the abſurdity ſtill remains where the action relents, if it be not actually ſuſpended for ſome time. This rule is alſo applicable to an epic poem: though in it a deviation from the rule is leſs remarkable; becauſe it is in the reader's power to hide the abſurdity, by proceeding inſtantly to another book. The firſt book of Paradiſe Loſt ends without any cloſe, perfect or imperfect: it breaks off abruptly, where Satan, ſeated on his throne, is prepared to harangue the convocated hoſt of the fallen angels; and the ſecond book begins with the ſpeech. Milton ſeems to have copied the Æneid, of which the two firſt books are divided much in the ſame manner. Neither is there any proper pauſe at the end of the ſeventh book of Paradiſe Loſt, nor at the end of the eleventh. In the Iliad little attention is given to this rule.

89
[illegible] comedy.

Beſides tragedy, dramatic poetry comprehends comedy and farce. Theſe are ſufficiently diſtinguiſhed from tragedy by their general ſpirit and ſtrain. "While pity and terror, and the other ſtrong paſſions, form the province of the tragic muſe, the chief or rather ſole inſtrument of comedy and farce is ridicule." Theſe two ſpecies of compoſition are ſo perpetually running into each other, that we ſhall not treat of them ſeparately; ſince what is now known by the name of *farce* differs in nothing eſſential from what was called the *old comedy* among the Greeks. "Comedy propoſes for its object * neither the great ſufferings nor the great crimes of men; but their follies and ſlighter vices, thoſe parts of their character which raiſe in beholders a ſenſe of impropriety, which expoſe them to be cenſured and laughed at by others, or which render them troubleſome in civil ſociety.

* *Blair's Lectures.*

"The ſubjects of tragedy are not limited to any age or country; but the ſcene and ſubject of comedy ſhould always be laid in our own country, and in our own times. The reaſon is obvious: thoſe decorums of behaviour, thoſe leſſer diſcriminations of character, which afford ſubject for comedy, change with the differences of countries and times; and can never be ſo well underſtood by foreigners as by natives. The comic poet, who aims at correcting improprieties and follies of behaviour, ſhould 'catch the manners living as they riſe.' It is not his buſineſs to amuſe us with a tale of other times; but to give us pictures taken from among ourſelves; to ſatirize

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(D) *Neve minor, neu ſit quinto productior actu*
Fabula. De Arte Poetica.

If you would have your play deſerve ſucceſs,
Give it five acts complete, nor more nor leſs. Francis.

reigning and preſent vices; to exhibit to the age a faithful copy of itſelf, with its humours, its follies, and its extravagancies.

90 Comedy of two kinds.

"Comedy may be divided into two kinds: comedy of *character*, and comedy of *intrigue*. The former is the more valuable ſpecies; becauſe it is the buſineſs of comedy to exhibit the prevailing manners which mark the character of the age in which the ſcene is laid: yet there ſhould be always as much intrigue as to give us ſomething to wiſh and ſomething to fear. The incidents ſhould ſo ſucceed one another, as to produce ſtriking ſituations, and to fix our attention; while they afford at the ſame time a proper field for the exhibition of character. The action in comedy, though it demands the poet's care in order to render it animated and natural, is a leſs ſignificant and important part of the performance than the action in tragedy: as in comedy it is what men ſay, and how they behave, that draws our attention, rather than what they perform or what they ſuffer.

91 The common faults of comedy.

"In the management of characters, one of the moſt common faults of comic writers is the carrying of them too far beyond life. Wherever ridicule is concerned, it is indeed extremely difficult to hit the preciſe point where true wit ends and buffoonery begins. When the miſer in Plautus, ſearching the perſon whom he ſuſpects of having ſtolen his caſket, after examining firſt his right hand and then his left, cries out, *oſtende etiam tertiam*—'ſhow me your third hand,' there is no one but muſt be ſenſible of the extravagance. Certain degrees of exaggeration are allowed to the comedian, but there are limits ſet to it by nature and good taſte; and ſuppoſing the miſer to be ever ſo much engroſſed by his jealouſy and his ſuſpicions, it is impoſſible to conceive any man in his wits ſuſpecting another of having more than two hands."

It appears from the plays of Ariſtophanes which remain, that the characters in the old comedy of Athens were almoſt always overcharged. They were likewiſe direct and avowed ſatires againſt particular perſons, who were brought upon the ſtage by name. "The ridicule employed in them is extravagant, the wit for the moſt part buffooniſh and farcical, the raillery biting and cruel, and the obſcenity that reigns in them is groſs and intolerable. They ſeem to have been compoſed merely for the mob." Yet of theſe abominable dramas, an excellent critic * has affirmed, with too much truth, that what is now called *farce* is nothing more than the ſhadow. The characters in genuine comedy are not thoſe of particular and known perſons, but the general characters of the age and nation; which it requires no ſmall ſkill to diſtinguiſh clearly and naturally from each other. In attempting this, poets are too apt to contraſt characters and introduce them always in pairs; which gives an affected air to the whole piece. The perfection of art is to conceal art. "A maſterly writer will give us his characters diſtinguiſhed rather by ſuch ſhades of diverſity as are commonly found in ſociety, than marked with ſuch ſtrong oppoſitions as are rarely brought into actual contraſt in any of the circumſtances of real life."

* *Hurd.*

92 The ſtyle of comedy.

The ſtyle of comedy ought to be pure, elegant, and lively, very ſeldom riſing higher than the ordinary tone of polite converſation; and upon no occaſion deſcending into vulgar, mean, and groſs expreſſions; and in one word, action and character being the fundamental parts of every epic and dramatic compoſition, the ſentiments and tone of language ought to be ſubſervient to theſe, ſo as to appear natural and proper for the occaſion.

§ 2. *Reſpective peculiarities of the Epopee and Drama.*

93 Machinery can have no place in a drama, nor

In a theatrical entertainment, which employs both the eye and the ear, it would be a groſs abſurdity to introduce upon the ſtage ſuperior beings in a viſible ſhape. There is no place for ſuch objection in an *epic poem*; and Boileau, with many other critics, declares ſtrongly for that ſort of machinery in an epic poem. But waving authority, which is apt to impoſe upon the judgement, let us draw what light we can from reaſon. We may in the firſt place obſerve, that this matter is but indiſtinctly handled by critics: the poetical privilege of animating inſenſible objects for enlivening a deſcription, is very different from what is termed *machinery*, where deities, angels, devils, or other ſupernatural powers, are introduced as real perſonages, mixing in the action, and contributing to the cataſtrophe; and yet theſe two things are conſtantly jumbled together in reaſoning. The former is founded on a natural principle: but nothing is more unnatural than the latter. Its effects, at the ſame time, are deplorable. Firſt, it gives an air of fiction to the whole; and prevents that impreſſion of reality which is requiſite to intereſt our affections, and to move our paſſions; which of itſelf is ſufficient to explode machinery, whatever entertainment it may afford to readers of a fantaſtic taſte or irregular imagination.

94 has it a good effect in the higher epic.

And, next, were it poſſible, by diſguiſing the fiction, to delude us into a notion of reality, an inſuperable objection would ſtill remain, which is, that the aim or end of an epic poem can never be attained in any perfection where machinery is introduced; for an evident reaſon, that virtuous emotions cannot be raiſed ſucceſsfully but by the actions of thoſe who are endued with paſſions and affections like our own, that is, by human actions; and as for moral inſtruction, it is clear, that none can be drawn from beings who act not upon the ſame principles with us. A fable in Æſop's manner is no objection to this reaſoning: his lions, bulls, and goats, are truly men under diſguiſe; they act and feel in every reſpect as human beings; and the moral we draw is founded on that ſuppoſition. Homer, it is true, introduces the gods into his fable: but the religion of his country authorized that liberty; it being an article in the Grecian creed, that the gods often interpoſe viſibly and bodily in human affairs. It muſt however be obſerved, that Homer's deities do no honour to his poems: fictions that trangreſs the bounds of nature, ſeldom have a good effect; they may inflame the imagination for a moment, but will not be reliſhed by any perſon of a correct taſte. They may be of ſome uſe to the lower rank of writers; but an author of genius has much finer materials, of Nature's production, for elevating his ſubject, and making it intereſting.

One would be apt to think, that Boileau, declaring for the Heathen deities, intended them only for embelliſhing the diction: but unluckily he baniſhes angels and devils, who undoubtedly make a figure in poetic language, equal to the Heathen deities. Boileau, therefore, by pleading for the latter in oppoſition to the former, certainly meant, if he had any diſtinct meaning, that the Heathen deities may be introduced as actors. And, in fact, he himſelf is guilty of that glaring abſurdity, where it is not ſo pardonable as in an epic poem: In his ode upon the taking of Namur, he demands with a moſt ſerious countenance, whether the walls were built by Apollo or Neptune: and in relating the paſſage of the Rhine, anno 1672, he deſcribes the god of that river as fighting with all his might to oppoſe the French monarch; which is confounding fiction with reality at a ſtrange rate. The French writers in general run into this error: wonderful the effect of cuſtom, entirely to hide from them how ridiculous ſuch fictions are.

That this is a capital error in *Gierusalemme Liberata*, Taſſo's greateſt admirers muſt acknowledge: a ſituation can never be intricate, nor the reader even in pain about the cataſtrophe, ſo long as there is an angel, devil, or magician, to lend a helping hand. Voltaire, in his eſſay upon epic poetry, talking of the *Pharſalia*, obſerves judiciouſly, "That the proximity of time, the notoriety of events, the character of the age, enlightened and political, joined with the ſolidity of Lucan's ſubject, deprived him of poetical fiction." Is it not amazing, that a critic who reaſons ſo juſtly with reſpect to others, can be ſo blind with reſpect to himſelf? Voltaire, not ſatisfied to enrich his language with images drawn from inviſible and ſuperior beings, introduces them into the action: in the ſixth canto of the *Henriade*, St Louis appears in perſon, and terrifies the ſoldiers; in the ſeventh canto, St Louis ſends the god of Sleep to Henry; and, in the tenth, the Demons of Diſcord, Fanaticiſm, War, &c. aſſiſt Aumale in a ſingle combat with Turenne, and are driven away by a good angel brandiſhing the ſword of God. To blend ſuch fictitious perſonages in the ſame action with mortals, makes a bad figure at any rate; and is intolerable in a hiſtory ſo recent as that of Henry IV. But perfection is not the lot of man.

But perhaps the moſt ſucceſsful weapon that can be employed upon this ſubject is ridicule. Addiſon has applied this in an elegant manner: "Whereas the time of a general peace is, in all appearance, drawing near; being informed that there are ſeveral ingenious perſons who intend to ſhow their talents on ſo happy an occaſion, and being willing, as much as in me lies, to prevent that effuſion of nonſenſe which we have good cauſe to apprehend; I do hereby ſtrictly require every perſon who ſhall write on this ſubject, to remember that he is a Chriſtian, and not to ſacrifice his catechiſm to his poetry. In order to it, I do expect of him, in the firſt place, to make his own poem, without depending upon Phœbus for any part of it, or calling out for aid upon any of the Muſes by name. I do likewiſe poſitively forbid the ſending of Mercury with any particular meſſage or diſpatch relating to the peace; and ſhall by no means ſuffer Minerva to take upon her the ſhape of any plenipotentiary concerned in this great work. I do further declare, that I ſhall not allow the Deſtinies to have had a hand in the deaths of the ſeveral thouſands who have been ſlain in the late war; being of opinion that all ſuch deaths may be well accounted for by the Chriſtian ſyſtem of powder and ball. I do therefore ſtrictly forbid the Fates to cut the thread of man's life upon any pretence whatſoever, unleſs it be for the ſake of rhyme. And whereas I have good reaſon to fear, that Neptune will have a great deal of buſineſs on his hands in ſeveral poems which we may now ſuppoſe are upon the anvil, I do alſo prohibit his appearance, unleſs it be done in metaphor, ſimile, or any very ſhort alluſion; and that even here he may not be permitted to enter, but with great caution and circumſpection. I deſire that the ſame rule may be extended to his whole fraternity of Heathen gods; it being my deſign to condemn every poem to the flames in which Jupiter thunders, or exerciſes any other act of authority which does not belong to him. In ſhort, I expect that no pagan agent ſhall be introduced, or any fact related which a man cannot give credit to with a good conſcience. Provided always, that nothing herein contained ſhall extend, or be conſtrued to extend to ſeveral of the female poets in this nation, who ſhall ſtill be left in full poſſeſſion of their gods and goddeſſes, in the ſame manner as if this paper had never been written." *Spect.* N° 523.

The marvellous is indeed ſo much promoted by machinery, that it is not wonderful to find it embraced by the bulk of writers, and perhaps of readers. If indulged at all, it is generally indulged to exceſs. Homer introduceth his deities with no greater ceremony than his mortals; and Virgil has ſtill leſs moderation: a pilot ſpent with watching cannot fall aſleep and drop into the ſea by natural means: one bed cannot receive the two lovers Æneas and Dido, without the immediate interpoſition of ſuperior powers. The ridiculous in ſuch fictions muſt appear even through the thickeſt veil of gravity and ſolemnity.

Angels and devils ſerve equally with Heathen deities as materials for figurative language; perhaps better among Chriſtians, becauſe we believe in them, and not in Heathen deities. But every one is ſenſible, as well as Boileau, that the inviſible powers in our creed make a much worſe figure as actors in a modern poem than the inviſible powers in the Heathen creed did in ancient poems; the cauſe of which is not far to ſeek. The Heathen deities, in the opinion of their votaries, were beings elevated one ſtep only above mankind, ſubject to the ſame paſſions, and directed by the ſame motives; therefore not altogether improper to mix with men in an important action. In our creed, ſuperior beings are placed at ſuch a mighty diſtance from us, and are of a nature ſo different, that with no propriety can we appear with them upon the ſame ſtage: man, a creature much inferior, loſes all dignity in the compariſon.

An hiſtorical poem admits of allegorical characters.

There can be no doubt that an hiſtorical poem admits the embelliſhment of allegory as well as of metaphor, ſimile, or other figure. Moral truth, in particular, is finely illuſtrated in the allegorical manner: it amuſes the fancy to find abſtract terms, by a ſort of magic, metamorphoſed into active beings; and it is delightful to trace a general propoſition in a pictured event. But allegorical beings ſhould be confined within their own ſphere, and never be admitted to mix in the principal action, nor to co-operate in retarding or advancing the cataſtrophe; which would have a ſtill worſe effect than inviſible powers: for the impreſſion of real exiſtence, eſſential to an epic poem, is inconſiſtent with that figurative exiſtence which is eſſential to an allegory; and therefore no method can more effectually prevent the impreſſion of reality than the introduction of allegorical beings co-operating with thoſe whom we conceive to be really exiſting. The love-epiſode in the Henriade (canto 9.), inſufferable by the diſcordant mixture of allegory with real life, is copied from that of Rinaldo and Armida in the *Gierusalemme Liberata*, which hath no merit to entitle it to be copied. An allegorical object, ſuch as Fame in the Æneid, and the Temple of Love in the Henriade, may find place in a deſcription: but to introduce Diſcord as a real perſonage, imploring the aſſiſtance of Love as another real perſonage, to enervate the courage of the hero, is making theſe figurative beings act beyond their ſphere, and creating a ſtrange jumble of truth and fiction. The allegory of Sin and Death in the Paradiſe Loſt is poſſibly not generally reliſhed, though it is not entirely of the ſame nature with what we have been condemning; in a work comprehending the atchievements of ſuperior beings there is more room for fancy than where it is confined to human actions.

96
Epiſode defined.

97
What conſtitutes a good epiſode.

What is the true notion of an epiſode? or how is it to be diſtinguiſhed from the principal action? Every incident that promotes or retards the cataſtrophe muſt be part of the principal action. This clears the nature of an epiſode; which may be defined, "An incident connected with the principal action, but contributing neither to advance nor retard it." The deſcent of Æneas into hell does not advance or retard the cataſtrophe, and therefore is an epiſode. The ſtory of Niſus and Euryalus, producing an alteration in the affairs of the contending parties, is a part of the principal action. The family-ſcene in the ſixth book of the Iliad is of the ſame nature; for by Hector's retiring from the field of battle to viſit his wife, the Grecians had opportunity to breathe, and even to turn upon the Trojans. The unavoidable effect of an epiſode according to this definition muſt be, to break the unity of action; and therefore it ought never to be indulged unleſs to unbend the mind after the fatigue of a long narration. An epiſode, when ſuch is its purpoſe, requires the following conditions: it ought to be well connected with the principal action; it ought to be lively and intereſting; it ought to be ſhort; and a time ought to be choſen when the principal action relents (E).

In the following beautiful epiſode, which cloſes the ſecond book of Fingal, all theſe conditions are united.

"Comal was a ſon of Albion; the chief of an hundred hills. His deer drunk of a thouſand ſtreams; and a thouſand rocks replied to the voice of his dogs. His face was the mildneſs of youth; but his hand the death of heroes. One was his love, and fair was ſhe! the daughter of mighty Conloch. She appeared like a ſunbeam among women, and her hair was like the wing of the raven. Her ſoul was fixed on Comal, and ſhe was his companion in the chace. Often met their eyes of love, and happy were their words in ſecret. But Gormal loved the maid, the chief of gloomy Ardven. He watched her lone ſteps on the heath, the foe of unhappy Comal.

"One day, tired of the chace, when the miſt had concealed their friends, Comal and the daughter of Conloch met in the cave of Ronan. It was the wonted haunt of Comal. Its ſides were hung with his arms; a hundred ſhields of thongs were there, a hundred helms of ſounding ſteel. Reſt here, ſaid he, my love Galvina, thou light of the cave of Ronan: a deer appears on Mora's brow; I go, but ſoon will return. I fear, ſaid ſhe, dark Gormal my foe: I will reſt here; but ſoon return, my love.

"He went to the deer of Mora. The daughter of Conloch, to try his love, clothed her white ſide with his armour, and ſtrode from the cave of Ronan. Thinking her his foe, his heart beat high, and his colour changed. He drew the bow: the arrow flew: Galvina fell in blood. He ran to the cave with haſty ſteps, and called the daughter of Conloch. Where art thou, my love? but no anſwer.——He marked, at length, her heaving heart beating againſt the mortal arrow. O Conloch's daughter, is it thou!—he ſunk upon her breaſt.

"The hunters found the hapleſs pair. Many and ſilent were his ſteps round the dark dwellings of his love. The fleet of the ocean came: he fought, and the ſtrangers fell: he ſearched for death over the field; but who could kill the mighty Comal? Throwing away his ſhield, an arrow found his manly breaſt. He ſleeps with his Galvina: their green tombs are ſeen by the mariner when he bounds on the waves of the north."

98
Double plot in a drama ſeldom ſucceſsful.

Next, upon the peculiarities of a *dramatic poem*. And the firſt we ſhall mention is a double plot: one of which muſt reſemble an epiſode in an epic poem; for it would diſtract the ſpectator, inſtead of entertaining him, if he were forced to attend at the ſame time to two capital plots equally intereſting. And even ſuppoſing it an under-plot like an epiſode, it ſeldom hath a good effect in tragedy, of which ſimplicity is a chief property; for an intereſting ſubject that engages our affections, occupies our whole attention, and leaves no room for any ſeparate concern. Variety is more tolerable in comedy; which pretends only to amuſe, without totally occupying the mind. But even there, to make a double plot agreeable, is no ſlight effort of art: the under plot ought not to vary greatly in its tone from the principal; for diſcordant emotions are unpleaſant when jumbled together; which, by the way, is an inſuperable objection to tragi-comedy. Upon that account the Provok'd Huſband deſerves cenſure; all the ſcenes that bring the family of the Wrongheads into action, being ludicrous and farcical, are in a very different tone from the principal ſcenes, diſplaying ſevere and bitter expoſtulations between Lord Townley and his lady. The ſame objection touches not the double plot of the Careleſs Huſband; the different ſubjects being ſweetly connected, and having only ſo much variety as to reſemble ſhades of colours harmoniouſly mixed. But this is not all. The under plot ought to be connected with that which is principal, ſo much at leaſt as to employ the ſame perſons: the under-plot ought to occupy the intervals or pauſes of the principal action; and both ought to be concluded together. This is the caſe of the Merry Wives of Windſor.

99
Violent action ought not to be repreſented.

Violent action ought never to be repreſented on the ſtage. While the dialogue goes on, a thouſand parti-

culars

(E) Homer's deſcription of the ſhield of Achilles is properly introduced at a time when the action relents, and the reader can bear an interruption. But the author of Telemachus deſcribes the ſhield of that young hero in the heat of battle; a very improper time for an interruption.

Of the Drama.

culars concur to delude us into an impreſſion of reality; genuine ſentiments, paſſionate language, and perſuaſive geſture: the ſpectator, once engaged, is willing to be deceived, loſes ſight of himſelf, and without ſcruple enjoys the ſpectacle as a reality. From this abſent ſtate he is rouſed by violent action; he wakes as from a pleaſing dream, and, gathering his ſenſes about him, finds all to be a fiction. Horace delivers the ſame rule; and founds it upon the ſame reaſon:

> Ne pueros coram populo Medea trucidet;
> Aut humana palam coquat exta nefarius Atreus;
> Aut in avem Progne vertatur, Cadmus in anguem:
> Quodcunque oſtendis mihi ſic, incredulus odi.

The French critics join with Horace in excluding blood from the ſtage; but overlooking the moſt ſubſtantial objection, they urge only that it is barbarous and ſhocking to a polite audience. The Greeks had no notion of ſuch delicacy, or rather effeminacy; witneſs the murder of Clytemneſtra by her ſon Oreſtes, paſſing behind the ſcene, as repreſented by Sophocles: her voice is heard calling out for mercy, bitter expoſtulations on his part, loud ſhrieks upon her being ſtabbed, and then a deep ſilence. An appeal may be made to every perſon of feeling, whether this ſcene be not more horrible than if the deed had been committed in ſight of the ſpectators upon a ſudden guſt of paſſion. If Corneille, in repreſenting the affair between Horatius and his ſiſter, upon which the murder enſues behind the ſcene, had no other view but to remove from the ſpectators a ſhocking action, he was guilty of a capital miſtake: for murder in cold blood, which in ſome meaſure was the caſe as repreſented, is more ſhocking to a polite audience, even where the concluſive ſtab is not ſeen, than the ſame act performed in their preſence by violent and unpremeditated paſſion, as ſuddenly repented of as committed. Addiſon's obſervation is juſt *, That no part of this incident ought to have been repreſented, but reſerved for a narrative, with every alleviating circumſtance in favour of the hero.

100 The proper conduct of the dialogue.

A few words upon the dialogue, which ought to be ſo conducted as to be a true repreſentation of nature. We talk not here of the ſentiments nor of the language (which are treated elſewhere); but of what properly belongs to dialogue-writing; where every ſingle ſpeech, ſhort or long, ought to ariſe from what is ſaid by the former ſpeaker, and furniſh matter for what comes after till the end of the ſcene. In this view, all the ſpeeches from firſt to laſt repreſent ſo many links of one regular chain. No author, ancient or modern, poſſeſſes the art of dialogue equal to Shakeſpeare. Dryden, in that particular, may juſtly be placed as his oppoſite. He frequently introduces three or four perſons ſpeaking upon the ſame ſubject, each throwing out his own notions ſeparately, without regarding what is ſaid by the reſt: take for an example the firſt ſcene of Aurenzebe. Sometimes he makes a number club in relating an event, not to a ſtranger, ſuppoſed ignorant of it, but to one another, for the ſake merely of ſpeaking; of which notable ſort of dialogue we have a ſpecimen in the firſt ſcene of the firſt part of the Conqueſt of Granada. In the ſecond part of the ſame tragedy, ſcene ſecond, the King, Abenamar, and Zulema, make their ſeparate obſervations, like ſo many ſoliloquies, upon the fluctuating temper of the mob; a dialogue ſo uncouth puts one in mind of two ſhepherds in a paſtoral, excited by a prize to pronounce verſes alternately, each in praiſe of his own miſtreſs.

This manner of dialogue-writing, beſides an unnatural air, has another bad effect; it ſtays the courſe of the action, becauſe it is not productive of any conſequence. In Congreve's comedies, the action is often ſuſpended to make way for a play of wit.

No fault is more common among writers than to prolong a ſpeech after the impatience of the perſon to whom it is addreſſed ought to prompt him or her to break in. Conſider only how the impatient actor is to behave in the mean time. To expreſs his impatience in violent action without interrupting would be unnatural; and yet to diſſemble his impatience, by appearing cool where he ought to be highly inflamed, would be no leſs ſo.

Rhyme being unnatural and diſguſtful in dialogue, is happily baniſhed from our theatre: the only wonder is that it ever found admittance, eſpecially among a people accuſtomed to the more manly freedom of Shakeſpeare's dialogue. By baniſhing rhyme, we have gained ſo much as never once to dream that there can be any further improvement. And yet, however ſuitable blank verſe may be to elevated characters and warm paſſions, it muſt appear improper and affected in the mouths of the lower ſort. Why then ſhould it be a rule, That every ſcene in tragedy muſt be in blank verſe? Shakeſpeare, with great judgement, has followed a different rule; which is, to intermix proſe with verſe, and only to employ the latter where it is required by the importance or dignity of the ſubject. Familiar thoughts and ordinary facts ought to be expreſſed in plain language: to hear, for example, a footman deliver a ſimple meſſage in blank verſe muſt appear ridiculous to every one who is not biaſſed by cuſtom. In ſhort, that variety of characters and of ſituations, which is the life of a play, requires not only a ſuitable variety in the ſentiments, but alſo in the diction.

§ 3. *The Three Unities.*

When we conſider the chain of cauſes and effects in the material world, independent of purpoſe, deſign, or thought, we find a number of incidents in ſucceſſion, without beginning, middle, or end: every thing that happens is both a cauſe and an effect; being the effect of what goes before, and the cauſe of what follows: one incident may affect us more, another leſs; but all of them are links in the univerſal chain: the mind, in viewing theſe incidents, cannot reſt or ſettle ultimately upon any one; but is carried along in the train without any cloſe.

101 In what the unity of action conſiſts.

But when the intellectual world is taken under view, in conjunction with the material, the ſcene is varied. Man acts with deliberation, will, and choice: he aims at ſome end; glory, for example, or riches, or conqueſt, the procuring happineſs to individuals, or to his country in general: he propoſes means, and lays plans to attain the end propoſed. Here are a number of facts or incidents leading to the end in view, the whole compoſing one chain by the relation of cauſe and effect. In running over a ſeries of ſuch facts or incidents, we cannot reſt upon any one; becauſe they are preſented to us as means only, leading to ſome end; but we reſt with ſatisfaction upon the end or ultimate event; becauſe there the purpoſe or aim of the chief perſon or perſons is accompliſhed. This indicates the beginning, the middle, and the end, of what Ariſtotle calls *an entire action* *. The ſtory naturally begins with deſcribing thoſe circumſtances which move the perſon who acts the principal part to form a plan, in order to compaſs ſome deſired event; the proſecution of that plan, and the obſtructions, carry the reader into the heat of action; the middle is properly where the action is the moſt involved; and the end is where the event is brought about, and the plan accompliſhed.

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* *Spectator*, N° 44.

We have given the foregoing example of a plan crowned with ſucceſs, becauſe it affords the cleareſt conception of a beginning, a middle, and an end, in which conſiſts *unity* of action; and indeed ſtricter unity cannot be imagined than in that caſe. But an action may have unity, or a beginning, middle, and end, without ſo intimate a relation of parts; as where the cataſtrophe is different from what is intended or deſired, which frequently happens in our beſt tragedies. In the Æneid, the hero, after may obſtructions, makes his plan effectual. The Iliad is formed upon a different model: it begins with the quarrel between Achilles and Agamemnon; goes on to deſcribe the ſeveral effects produced by that cauſe; and ends in a reconciliation. Here is unity of action, no doubt, a beginning, a middle, and an end; but inferior to that of the Æneid, which will thus appear. The mind hath a propenſity to go forward in the chain of hiſtory; it keeps always in view the expected event; and when the incidents or underparts are connected by their relation to the event, the mind runs ſweetly and eaſily along them. This pleaſure we have in the Æneid. It is not altogether ſo pleaſant to connect, as in the Iliad, effects by their common cauſe; for ſuch connection forces the mind to a continual retroſpect; looking backward is like walking backward.

Elem. of Criticiſm.

102
Unity of action a capital beauty.

If unity of action be a capital beauty in fable imitative of human affairs, a plurality of unconnected fables muſt be a capital deformity. For the ſake of variety we indulge an under-plot that is connected with the principal; but two unconnected events are extremely unpleaſant, even where the ſame actors are engaged in both. Arioſto is quite licentious in that particular: he carries on at the ſame time a plurality of unconnected ſtories. His only excuſe is, that his plan is perfectly well adjuſted to his ſubject; for every thing in the *Orlando Furioſo* is wild and extravagant.

Though to ſtate facts in the order of time be natural, yet that order may be varied for the ſake of conſpicuous beauties. If, for example, a noted ſtory, cold and ſimple in its firſt movements, be made the ſubject of an epic poem, the reader may be hurried into the heat of action; reſerving the preliminaries for a converſation piece, if thought neceſſary; and that method, at the ſame time, has a peculiar beauty from being dramatic. But a privilege that deviates from nature ought to be ſparingly indulged; and yet romauce writers make no difficulty of preſenting to the reader, without the leaſt preparation, unknown perſons engaged in ſome arduous adventure equally unknown. In Caſſandra, two perſonages, who afterwards are diſcovered to be the heroes of the fable, ſtart up completely armed upon the banks of the Euphrates, and engage in a ſingle combat.

A play analyſed is a chain of connected facts, of which each ſcene makes a link. Each ſcene, accordingly, ought to produce ſome incident relative to the cataſtrophe or ultimate event, by advancing or retarding it. A ſcene that produceth no incident, and for that reaſon may be termed *barren*, ought not to be indulged, becauſe it breaks the unity of action: a barren ſcene can never be intitled to a place, becauſe the chain is complete without it. In the Old Bachelor, the 3d ſcene of act 2. and all that follow to the end of that act, are mere converſation-pieces, productive of no conſequence. The 10th and 11th ſcenes, act 3. Double Dealer, and the 10th, 11th, 12th, 13th, and 14th ſcenes, act 1. Love for Love, are of the ſame kind. Neither is The Way of World entirely guiltleſs of ſuch ſcenes. It will be no juſtification that they help to diſplay characters: it were better, like Dryden in his *dramatis perſonæ*, to deſcribe characters beforehand, which would not break the chain of action. But a writer of genius has no occaſion for ſuch artifice; he can diſplay the characters of his perſonages much more to the life in ſentiment and action. How ſucceſsfully is this done by Shakeſpeare! in whoſe works there is not to be found a ſingle barren ſcene.

Upon the whole, it appears, that all the facts in an hiſtorical fable ought to have a mutual connection, by their common relation to the grand event or cataſtrophe. And this relation, in which the *unity* of action conſiſts, is equally eſſential to epic and dramatic compoſitions.

103
Whether unity of time and of place be eſſential.

How far the unities of time and of place are eſſential, is a queſtion of greater intricacy. Theſe unities were ſtrictly obſerved in the Greek and Roman theatres; and they are inculcated by the French and Engliſh critics as eſſential to every dramatic compoſition. In theory theſe unities are alſo acknowledged by our beſt poets, though their practice ſeldom correſponds: they are often forced to take liberties, which they pretend not to juſtify, againſt the practice of the Greeks and Romans, and againſt the ſolemn deciſion of their own countrymen. But in the courſe of this inquiry it will be made evident, that in this article we are under no neceſſity to copy the ancients; and that our critics are guilty of a miſtake, in admitting no greater latitude of place and time than was admitted in Greece and Rome.

Indeed the unities of place and time are not, by the moſt rigid critics, required in a narrative poem. In ſuch compoſition, if it pretend to copy nature, theſe unities would be abſurd; becauſe real events are ſeldom confined within narrow limits either of place or of time: and yet we can follow hiſtory, or an hiſtorical fable, through all its changes, with the greateſt facility; we never once think of meaſuring the real time by what is taken in reading; nor of forming any connection between the place of action and that which we occupy.

We are aware, that the drama differs ſo far from the epic as to admit different rules. It will be obſerved, "That an hiſtorical fable, intended for reading ſolely, is under no limitation of time or of place more than a genuine hiſtory; but that a dramatic compoſition cannot be accurately repreſented unleſs it be limited, as its repreſentation is, to one place and to a few hours; and therefore that no fable can be admitted but what has theſe properties, becauſe it would be abſurd to compoſe a piece for repreſentation that cannot be juſtly repreſented." This argument has at leaſt a plauſible appearance; and yet one is apt to ſuſpect ſome fallacy, conſidering that no critic, however ſtrict, has ventured to confine the unities of place and of time within ſo narrow bounds.

A view of the Grecian drama, compared with our own, may

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* *Poet.* c. 6.

The three Unities.

may perhaps relieve us from this dilemma: if they be differently contructed, as ſhall be made evident, it is poſſible that the foregoing reaſoning may not be equally applicable to both.

104
They were eſſential to the Greek drama, but

All authors agree, that tragedy in Greece was derived from the hymns in praiſe of Bacchus, which were ſung in parts by a chorus. Theſpis, to relieve the ſingers, and for the ſake of variety, introduced one actor, whoſe province it was to explain hiſtorically the ſubject of the ſong, and who occaſionally repreſented one or other perſonage. Eſchylus, introducing a ſecond actor, formed the dialogue; by which the performance became dramatic; and the actors were multiplied when the ſubject repreſented made it neceſſary. But ſtill the chorus, which gave a beginning to tragedy, was conſidered as an eſſential part. The firſt ſcene, generally, unfolds the preliminary circumſtances that lead to the grand event; and this ſcene is by Ariſtotle termed the *prologue*. In the ſecond ſcene, where the action properly begins, the chorus is introduced, which, as originally, continues upon the ſtage during the whole performance: the chorus frequently makes one in the dialogue; and when the dialogue happens to be ſuſpended, the chorus, during the interval, is employed in ſinging. Sophocles adheres to this plan religiouſly. Euripides is not altogether ſo correct. In ſome of his pieces it becomes neceſſary to remove the chorus for a little time: but when that unuſual ſtep is riſked, matters are ſo ordered as not to interrupt the repreſentation: the chorus never leave the ſtage of their own accord, but at the command of ſome principal perſonage, who conſtantly waits their return.

Thus the Grecian drama is a continued repreſentation without any interruption; a circumſtance that merits attention. A continued repreſentation without a pauſe affords not opportunity to vary the place of action, nor to prolong the time of the action beyond that of the repreſentation. To a repreſentation ſo confined in place and time, the foregoing reaſoning is ſtrictly applicable: a real or feigned action, that is brought to a concluſion after conſiderable intervals of time and frequent changes of place, cannot accurately be copied in a repreſentation that admits no latitude in either. Hence it is, that the unities of place and of time, were, or ought to have been, ſtrictly obſerved in the Greek tragedies; which is made neceſſary by the very conſtitution of their drama, for it is abſurd to compoſe a tragedy that cannot be juſtly repreſented.

105
not to the French or Engliſh.

Modern critics, who for our drama pretend to eſtabliſh rules founded on the practice of the Greeks, are guilty of an egregious blunder. The unities of place and of time were in Greece, as we ſee, a matter of neceſſity, not of choice; and it is eaſy to ſhow, that if we ſubmit to ſuch fetters, it muſt be from choice, not neceſſity. This will be evident upon taking a view of the conſtitution of our drama, which differs widely from that of Greece; whether more or leſs perfect, is a different point, to be handled afterward. By dropping the chorus, opportunity is afforded to divide the repreſentation by intervals of time, during which the ſtage is evacuated and the ſpectacle ſuſpended. This qualifies our drama for ſubjects ſpread through a wide ſpace both of time and of place: the time ſuppoſed to paſs during the ſuſpenſion of the repreſentation is not meaſured by the time of the ſuſpenſion; and any place may be ſuppoſed, as it is not in ſight: by which means, many ſubjects can be juſtly repreſented in our theatres, that were excluded from thoſe of ancient Greece. This doctrine may be illuſtrated, by comparing a modern play to a ſet of hiſtorical pictures; let us ſuppoſe them five in number, and the reſemblance will be complete: each of the pictures reſembles an act in one of our plays: there muſt neceſſarily be the ſtricteſt unity of place and of time in each picture; and the ſame neceſſity requires theſe two unities during each act of a play, becauſe during an act there is no interruption in the ſpectacle. Now, when we view in ſucceſſion a number of ſuch hiſtorical pictures, let it be, for example, the hiſtory of Alexander by Le Brun, we have no difficulty to conceive, that months or years have paſſed between the events exhibited in two different pictures, though the interruption is imperceptible in paſſing our eye from the one to the other; and we have as little difficulty to conceive a change of place, however great: in which view, there is truly no difference between five acts of a modern play and five ſuch pictures. Where the repreſentation is ſuſpended, we can with the greateſt facility ſuppoſe any length of time or any change of place: the ſpectator, it is true, may be conſcious, that the real time and place are not the ſame with what are employed in the repreſentation; but this is a work of reflection; and by the ſame reflection he may alſo be conſcious, that Garrick is not King Lear, that the playhouſe is not Dover cliffs, nor the noiſe he hears thunder and lightning. In a word, after an interruption of the repreſentation, it is not more difficult for a ſpectator to imagine a new place, or a different time, than, at the commencement of the play, to imagine himſelf at Rome, or in a period of time two thouſand years back. And indeed, it is abundantly ridiculous, that a critic, who is willing to hold candlelight for ſunſhine, and ſome painted canvaſſes for a palace or a priſon, ſhould affect ſo much difficulty in imagining a latitude of place or of time in the fable, beyond what is neceſſary in the repreſentation.

106
Great latitude in time, however not to be indulged,

There are, it muſt be acknowledged, ſome effects of great latitude in time that ought never to be indulged in a compoſition for the theatre: nothing can be more abſurd, than at the cloſe to exhibit a full grown perſon who appears a child at the beginning: the mind rejects, as contrary to all probability, ſuch latitude of time as is requiſite for a change ſo remarkable. The greateſt change from place to place hath not altogether the ſame bad effect: in the bulk of human affairs place is not material; and the mind, when occupied with an intereſting event, is little regardful of minute circumſtances: theſe may be varied at will, becauſe they ſcarcely make any impreſſion.

107
nor in place.

At the ſame time, it is not here meant to juſtify liberty without any reſerve. An unbounded licence with relation to place and time, is faulty, for a reaſon that ſeems to have been overlooked, which is, that it ſeldom fails to break the unity of action: in the ordinary courſe of human affairs, ſingle events, ſuch as are fit to be repreſented on the ſtage, are confined to a narrow ſpot, and generally employ no great extent of time; and accordingly we ſeldom find ſtrict unity of action in a dramatic compoſition, where any remarkable latitude is indulged in theſe particulars. It may even be admitted, that a compoſition [illegible] which employs but one place, and requires not a greater length of time than is neceſſary for the repreſentation, is [illegible] ſo much the more perfect; becauſe the confining an event within ſo narrow bounds, contributes to the unity of action, and alſo prevents that labour, however ſlight, which the mind muſt undergo in imagining frequent changes of place, and many intervals of time. But ſtill we muſt inſiſt, that ſuch limitation of place and time as was neceſſary in the Grecian drama, is no rule to us; and therefore, that though ſuch limitation adds one beauty more to the compoſition, it is at beſt but a refinement, which may juſtly give place to a thouſand beauties more ſubſtantial. And we may add, that it is extremely difficult, if not impracticable, to contract within the Grecian limits any fable ſo fruitful of incidents in number and variety as to give full ſcope to the fluctuation of paſſion.

It may now appear, that critics who put the unities of place and of time upon the ſame footing with the unity of action, making them all equally eſſential, have not attended to the nature and conſtitution of the modern drama. If they admit an interrupted repreſentation, with which no writer finds fault, it is abſurd to reject its greateſt advantage, that of repreſenting many intereſting ſubjects excluded from the Grecian ſtage. If there needs muſt be a reformation, why not reſtore the ancient chorus and the ancient continuity of action? There is certainly no medium; for to admit an interruption without relaxing from the ſtrict unities of place and of time, is in effect to load us with all the inconveniences of the ancient drama, and at the ſame time to withhold from us its advantages.

108
Whether our drama be preferable to that of Greece.

And therefore the only proper queſtion is, Whether our model be or be not a real improvement? This indeed may fairly be called in queſtion; and in order to a comparative trial, ſome particulars muſt be premiſed. When a play begins, we have no difficulty to adjuſt our imagination to the ſcene of action, however diſtant it be in time or in place; becauſe we know that the play is a repreſentation only. The caſe is very different after we are engaged: it is the perfection of repreſentation to hide itſelf, to impoſe on the ſpectator, and to produce in him an impreſſion of reality, as if he were ſpectator of a real event; but any interruption annihilates that impreſſion, by rouſing him out of his waking dream, and unhappily reſtoring him to his ſenſes. So difficult it is to ſupport the impreſſion of reality, that much ſlighter interruptions than the interval between two acts are ſufficient to diſſolve the charm: in the 5th act of the *Mourning Bride*, the three firſt ſcenes are in a room of ſtate, the fourth in a priſon; and the change is operated by ſhifting the ſcene, which is done in a trice: but however quick the tranſition may be, it is impracticable to impoſe upon the ſpectators ſo as to make them conceive that they are actually carried from the palace to the priſon; they immediately reflect, that the palace and priſon are imaginary, and that the whole is a fiction.

From theſe premiſes, one will naturally be led, at firſt view, to pronounce the frequent interruptions in the modern drama to be an imperfection. It will occur, "That every interruption muſt have the effect to baniſh the dream of reality, and with it to baniſh our concern, which cannot ſubſiſt while we are conſcious that all is a fiction; and therefore, that in the modern drama, ſufficient time is not afforded for fluctuation and ſwelling of paſſion, like what is afforded in that of Greece, where there is no interruption." This reaſoning, it muſt be owned, has a ſpecious appearance: but we muſt not become faint-hearted upon the firſt repulſe; let us rally our troops for a ſecond engagement.

On the Greek ſtage, whatever may have been the caſe on the Roman, the repreſentation was never interrupted, and the diviſion by acts was totally unknown. The word *act* never once occurs in Ariſtotle's Poetics, in which he defines exactly every part of the drama, and divides it into the beginning, the middle, and the end. At certain intervals indeed the actors retired; but the ſtage was not then left empty, nor the curtain let fall; for the chorus continued and ſung. Neither do theſe ſongs of the chorus divide the Greek tragedies into five portions ſimilar to our acts; though ſome of the commentators have endeavoured to force them into this office. But it is plain, that the intervals at which the chorus ſung are extremely unequal and irregular, ſuited to the occaſion and the ſubject; and would divide the play ſometimes into three, ſometimes into ſeven or eight acts.

As practice has now eſtabliſhed a different plan on the modern ſtage, has divided every play into five acts, and made a total pauſe in the repreſentation at the end of each act, the queſtion to be conſidered is, Whether the plan of the ancient or of the modern drama is beſt qualified for making a deep impreſſion on the mind? That the preference is due to the plan of the modern drama, will be evident from the following conſiderations. If it be indeed true, as the advocates for the three unities allege, that the audience is deluded into the belief of the reality of a well-acted tragedy, it is certain that this deluſion cannot be long ſupported; for when the ſpirits are exhauſted by cloſe attention, and by the agitation of paſſion, an uneaſineſs enſues, which never fails to baniſh the waking dream. Now ſuppoſing the time that a man can employ with ſtrict attention without wandering to be no greater than is requiſite for a ſingle act (a ſuppoſition that cannot be far from truth), it follows, that a continued repreſentation of longer endurance than an act, inſtead of giving ſcope to fluctuation and ſwelling of paſſion, would overſtrain the attention, and produce a total abſence of mind. In this reſpect, the four pauſes have a fine effect: for by affording to the audience a ſeaſonable reſpite when the impreſſion of reality is gone, and while nothing material is in agitation, they relieve the mind from its fatigue; and conſequently prevent a wandering of thought at the very time poſſibly of the moſt intereſting ſcenes.

In one article, indeed, the Grecian model has greatly the advantage: its chorus, during an interval, not only preſerves alive the impreſſions made upon the audience, but alſo prepares their hearts finely for new impreſſions. In our theatres, on the contrary, the audience, at the end of every act, being left to trifle time away, loſe every warm impreſſion; and they begin the next act cool and unconcerned, as at the commencement of the repreſentation. This is a groſs malady in our theatrical repreſentations; but a malady that luckily is not incurable: to revive the Grecian chorus, would be to revive the Grecian ſlavery of place and time; but we can figure a detached chorus coinciding with a pauſe in the repreſentation, as the ancient chorus did with a pauſe in the principal action. What objection, for example, can there lie againſt muſic between the acts, vocal and inſtrumental, 109 An improvement of the modern drama ſuggeſted. *Elem. of Criticiſm*, chap. 23.

inſtrumental, adapted to the ſubject? Such detached chorus, without putting us under any limitation of time or place, would recruit the ſpirits, and would preſerve entire the tone, if not the tide, of paſſion: the muſic, after an act, ſhould commence in the tone of the preceding paſſion, and be gradually varied till it accord with the tone of the paſſion that is to ſucceed in the next act. The muſic and the repreſentation would both of them be gainers by their conjunction; which will thus appear. Muſic that accords with the preſent tone of mind, is, on that account, doubly agreeable; and accordingly, though muſic ſingly hath not power to raiſe a paſſion, it tends greatly to ſupport a paſſion already raiſed. Further, muſic prepares us for the paſſion that follows, by making cheerful, tender, melancholy, or animated impreſſions, as the ſubject requires. Take for an example the firſt ſcene of the *Mourning Bride*, where ſoft muſic, in a melancholy ſtrain, prepares us for Almeria's deep diſtreſs. In this manner, muſic and repreſentation ſupport each other delightfully: the impreſſion made upon the audience by the repreſentation, is a fine preparation for the muſic that ſucceeds; and the impreſſion made by the muſic is a fine preparation for the repreſentation that ſucceeds. It appears evident, that by ſome ſuch contrivance, the modern drama may be improved, ſo as to enjoy the advantage of the ancient chorus without its ſlaviſh limitation of place and time. But to return to the compariſon between the ancient and the modern drama.

110 The modern drama preferable to the ancient.

The numberleſs improprieties forced upon the Greek dramatic poets by the conſtitution of their drama, may be ſufficient, one ſhould think, to make us prefer the modern drama, even abſtracting from the improvement propoſed. To prepare the reader for this article, it muſt be premiſed, that as in the ancient drama the place of action never varies, a place neceſſarily muſt be choſen to which every perſon may have acceſs without any improbability. This confines the ſcene to ſome open place, generally the court or area before a palace; which excludes from the Grecian theatre tranſactions within doors, though theſe commonly are the moſt important. Such cruel reſtraint is of itſelf ſufficient to cramp the moſt pregnant invention; and accordingly the Greek writers, in order to preſerve unity of place, are reduced to woful improprieties. In the *Hippolytus* of Euripides (act i. ſc. 6.), Phædra, diſtreſſed in mind and body, is carried without any pretext from her palace to the place of action; is there laid upon a couch, unable to ſupport herſelf upon her limbs; and made to utter many things improper to be heard by a number of women who form the chorus: and what is ſtill more improper, her female attendant uſes the ſtrongeſt intreaties to make her reveal the ſecret cauſe of her anguiſh; which at laſt Phædra, contrary to decency and probability, is prevailed upon to do in preſence of that very chorus (act ii. ſc. 2.). Alceſtes, in Euripides, at the point of death, is brought from the palace to the place of action, groaning and lamenting her untimely fate (act ii. ſc. 1.). In the *Trachiniæ* of Sophocles (act ii.), a ſecret is imparted to Dejanira, the wife of Hercules, in preſence of the chorus. In the tragedy of *Iphigenia*, the meſſenger employed to inform Clytemneſtra that Iphigenia was ſacrificed, ſtops ſhort at the place of action, and with a loud voice calls the queen from her palace to hear the news. Again, in the *Iphigenia in Tauris* (act iv.), the neceſſary preſence of the chorus forces Euripides into a groſs abſurdity, which is to form a ſecret in their hearing; and, to diſguiſe the abſurdity, much court is paid to the chorus, not one woman but a number, to engage them to ſecrecy. In the *Medea* of Euripides, that princeſs makes no difficulty, in preſence of the chorus, to plot the death of her huſband, of his miſtreſs, and of her father the king of Corinth, all by poiſon: it was neceſſary to bring Medea upon the ſtage; and there is but one place of action, which is always occupied by the chorus. This ſcene cloſes the ſecond act; and in the end of the third, ſhe frankly makes the chorus her confidants in plotting the murder of her own children. Terence, by identity of place, is often forced to make a converſation within doors be heard on the open ſtreet: the cries of a woman in labour are there heard diſtinctly.

111 Inconveniences of the plan of the ancient drama.

The Greek poets are not leſs hampered by unity of time than by that of place. In the *Hippolytus* of Euripides, that prince is baniſhed at the end of the 4th act; and in the firſt ſcene of the following act, a meſſenger relates to Theſeus the whole particulars of the death of Hippolytus by the ſea-monſter: that remarkable event muſt have occupied many hours; and yet in the repreſentation it is confined to the time employed by the chorus upon the ſong at the end of the 4th act. The inconſiſtency is ſtill greater in the *Iphigenia in Tauris* (act v. ſc. 4.): the ſong could not exhauſt half an hour; and yet the incidents ſuppoſed to have happened during that time could not naturally have been tranſacted in leſs than half a day.

The Greek artiſts are forced, not leſs frequently, to tranſgreſs another rule, derived alſo from a continued repreſentation. The rule is, that as a vacuity, however momentary, interrupts the repreſentation, it is neceſſary that the place of action be conſtantly occupied. Sophocles, with regard to that rule as well as to others, is generally correct: but Euripides cannot bear ſuch reſtraint; he often evacuates the ſtage, and leaves it empty for others. Iphigenia in Tauris, after pronouncing a ſoliloquy in the firſt ſcene, leaves the place of action, and is ſucceeded by Oreſtes and Pylades: they, after ſome converſation, walk off; and Iphigenia re-enters, accompanied with the chorus. In the Alceſtes, which is of the ſame author, the place of action is void at the end of the third act. It is true, that to cover the irregularity, and to preſerve the repreſentation in motion, Euripides is careful to fill the ſtage without loſs of time: but this ſtill is an interruption, and a link of the chain broken: for during the change of the actors, there muſt be a ſpace of time, during which the ſtage is occupied by neither ſet. It makes indeed a more remarkable interruption, to change the place of action as well as the actors; but that was not practicable upon the Grecian ſtage.

It is hard to ſay upon what model Terence has formed his plays. Having no chorus, there is a pauſe in the repreſentation at the end of every act: but advantage is not taken of the ceſſation, even to vary the place of action; for the ſtreet is always choſen, where every thing paſſing may be ſeen by every perſon; and by that choice, the moſt ſprightly and intereſting parts of the action, which commonly paſs within doors, are excluded:

the Drama.

[illegible]

ed; unleſs in the laſt act of the *Eunuch*. He hath ſubmitted to the like ſlavery with reſpect to time. In a word, a play with a regular chorus, is not more confined in place and time than his plays are. Thus a zealous ſectary follows implicitly ancient forms and ceremonies, without once conſidering whether their introductive cauſe be ſtill ſubſiſting. Plautus, of a bolder genius than Terence, makes good uſe of the liberty afforded by an interrupted repreſentation: he varies the place of action upon all occaſions, when the variation ſuits his purpoſe.

112 No change of place to be admitted but between the acts.

The intelligent reader will by this time underſtand, that we plead for no change of place in our plays but after an interval, nor for any latitude in point of time but what falls in with an interval. The unities of place and time ought to be ſtrictly obſerved during each act; for during the repreſentation there is no opportunity for the ſmalleſt deviation from either. Hence it is an eſſential requiſite, that during an act the ſtage be always occupied; for even a momentary vacuity makes an interval or interruption. Another rule is no leſs eſſential: it would be a groſs breach of the unity of action to exhibit upon the ſtage two ſeparate actions at the ſame time; and therefore, to preſerve that unity, it is neceſſary that each perſonage introduced during an act be linked to thoſe in poſſeſſion of the ſtage, ſo as to join all in one action. Theſe things follow from the very conception of an act, which admits not the ſlighteſt interruption: the moment the repreſentation is intermitted, there is an end of that act; and we have no other notion of a new act, but where, after a pauſe or interval, the repreſentation is again put in motion. French writers, generally ſpeaking, are correct in this particular. The Engliſh, on the contrary, are ſo irregular as ſcarce to deſerve a criticiſm; actors not only ſucceed each other in the ſame place without connection, but, what is ſtill leſs excuſable, they frequently ſucceed each other in different places. This change of place in the ſame act ought never to be indulged; for, beſide breaking the unity of the act, it has a diſagreeable effect: after an interval, the imagination adapts itſelf to any place that is neceſſary, as readily as at the commencement of the play; but during the repreſentation we reject change of place. From the foregoing cenſure muſt be excepted the *Mourning Bride* of Congreve, where regularity concurs with the beauty of ſentiment and of language, to make it one of the moſt complete pieces England has to boaſt of. It is acknowledged, however, that in point of regularity this elegant performance is not altogether unexceptionable. In the four firſt acts, the unities of place and time are ſtrictly obſerved: but in the laſt act, there is a capital error with reſpect to unity of place; for in the three firſt ſcenes of that act, the place of action is a room of ſtate, which is changed to a priſon in the fourth ſcene: the chain alſo of the actors is broken; as the perſons introduced in the priſon are different from thoſe who made their appearance in the room of ſtate. This remarkable interruption of the repreſentation makes in effect two acts inſtead of one: and therefore, if it be a rule that a play ought not to conſiſt of more acts than five, this performance is ſo far defective in point of regularity. It may be added, that, even admitting ſix acts, the irregularity would not be altogether removed, without a longer pauſe in the repreſentation than is allowed in the acting; for more than a momentary interruption is requiſite for enabling the imagination readily to fall in with a new place, or with a wide ſpace of time. In *The Way of the World*, of the ſame author, unity of place is preſerved during every act, and a ſtricter unity of time during the whole play than is neceſſary.

Of the Opera.

§ 4. *Of the Opera.*

113 The opera, a drama repreſented by muſic,

An opera is a drama repreſented by muſic. This entertainment was invented at Venice. An exhibition of this ſort requires a moſt brilliant magnificence, and an expence truly royal. The drama muſt neceſſarily be compoſed in verſe; for as operas are ſung and accompanied with ſymphonies, they muſt be in verſe to be properly applicable to muſic. To render this entertainment ſtill more brilliant, it is ornamented with dances and ballets, with ſuperb decorations, and ſurpriſing machinery. The dreſſes of the actors, of thoſe who aſſiſt in the chorus, and of the dancers, being all in the moſt ſplendid and elegant taſte, contribute to render the exhibition highly ſumptuous. But notwithſtanding this union of arts and pleaſures at an immenſe expence, and notwithſtanding a moſt dazzling pageantry, an opera appears, in the eyes of many people of taſte, but as a magnificent abſurdity, ſeeing that nature is never there from the beginning to the end. It is not our buſineſs here, however, to determine between the different taſtes of mankind.

The method of expreſſing our thoughts by ſinging and muſic is ſo little natural, and has ſomething in it ſo forced and affected, that it is not eaſy to conceive how it could come into the minds of men of genius to repreſent any human action, and, what is more, a ſerious or tragic action, any otherwiſe than by ſpeech. We have, it is true, operas in Engliſh by Addiſon, &c. in Italian by Metaſtaſio, in French by M. Quinault, Fontenelle, &c. the ſubjects of which are ſo grave and tragic, that one might call them muſical tragedies, and real *chefs d'œuvres* in their kind. But though we are highly ſatisfied and greatly affected on reading them, and are much pleaſed with ſeeing them repreſented, yet the ſpectator is, perhaps, more charmed with the magnificence of the ſight and the beauty of the muſic, than moved with the action and the tragical part of the performance. We are not, however, of that order of critics who ſtrive to prove, that mankind act wrong in finding pleaſure in an object with which they are really pleaſed; who blame a lover for thinking his miſtreſs charming, when her features are by no means regular; and who are perpetually applying the rules of logic to the works of genius: we make theſe obſervations merely in order to examine if it be not poſſible to augment the pleaſures of a polite people, by making the opera ſomething more natural, more probable, and more conſonant to reaſon.

Bielfeld's Elem. of Erudition.

114 ſhould take its ſubject not from hiſtory but from fable and enchantment.

We think, therefore, that the poet ſhould never, or at leaſt very rarely, chooſe a ſubject from hiſtory, but from fable or mythology, or from the regions of enchantment. Every rational mind is conſtantly ſhocked to hear a mutilated hero trill out, from the ſlender pipe of a chaffinch, *To arms! To arms!* and in the ſame tone animate his ſoldiers, and lead them to the aſſault; or harangue an aſſembly of grave ſenators, and ſometimes a whole body of people. Nothing can be more

On the Opera.

[illegible] a man muſt be poſſeſſed of a very uncommon ſenſibility to be affected by them. But as we know not what was the language of the gods, and their manner of expreſſing themſelves, we are at liberty in that reſpect to uſe what idioms we pleaſe, and to ſuppoſe that they [illegible] to diſtinguiſh themſelves from mortals. Beſides, as the magic of decorations and machinery become natural, and even neceſſary, in theſe kinds of [illegible]; and they readily afford opportunity to add to the pomp of theſe performances. The chorus, the dances, the ballettes, the ſymphonies and dreſſes, may likewiſe be all made to correſpond with ſuch a ſubject, nothing [illegible] abſurd, violent, or unnatural. Whoever is poſſeſſed of genius, and is well acquainted with mythology, will there find an inexhauſtible ſource of ſubjects highly diverſified, and quite proper for the drama of an opera.

We ſhall not ſpeak here of that ſort of muſic which appears to us the moſt proper for ſuch a drama, and of the ſeveral alterations of which we think it ſuſceptible, in order to make it more complete, and to adapt it to a more pathetic, more noble, and more natural expreſſion, as well in the recitatives as in the airs and chorus. (See Music). We have only here to conſider the buſineſs of the poet. He ſhould never loſe ſight of nature, even in the midſt of the greateſt fiction. A god, a demi-god, a renowned hero, ſuch for example as Renaud in *Armida*, a fairy, a genie, a nymph, or fury, &c. ſhould conſtantly be repreſented according to the characters we give them, and never be made to talk the language of a fop or a *petite maitreſſe*. The recitative, which is the ground-work of the dialogue, requires verſes that are free and not regular, ſuch as with a ſimple cadence approach the neareſt to common language. The airs ſhould not be forced into the piece, nor improperly placed for the ſake of terminating a ſcene, or to diſplay the voice of a performer: they ſhould expreſs ſome ſentiment, or ſome precept, ſhort and ſtriking, or tender and affecting: or ſome ſimile lively and natural; and they ſhould ariſe of themſelves from a monologue, or from a ſcene between two perſons: prolixity ſhould here be particularly avoided, eſpecially when ſuch an air makes part of a dialogue; for nothing is more inſipid or diſguſtful than the countenances of the other actors who appear at the ſame time, whoſe ſilence is quite unmeaning, and who know not what to do with their hands and feet while the ſinger is ſtraining his throat. The verſe of all the airs ſhould be of the lyric kind, and ſhould contain ſome poetic image, or paint ſome noble paſſion, which may furniſh the compoſer with an opportunity of diſplaying his talents, and of giving a lively and affecting expreſſion to the muſic. A phraſe that is inanimated can never have a good effect in the performance, but muſt become inſipid and horribly tedious in the air. The trite ſimilies of the Italians, of a ſtream that flows, or a bird that flies, &c. are no longer ſufferable. The ſame thing may be ſaid with regard to the chorus, which ſhould be equally natural and well adapted: it is here ſometimes a whole people, ſometimes the inhabitants of a peculiar country, and ſometimes warriors, nymphs, or prieſts, &c. who raiſe their voice to demand juſtice, to implore favour, or render a general homage. The action itſelf will furniſh the poet of genius with ideas, [illegible] the manner of diſpoſing them.

115 and ſhould repreſent its characters as conſiſtent.

Laſtly, the opera being a performance calculated leſs to ſatiſfy the underſtanding than to charm the ear and affect the heart, and eſpecially to ſtrike the ſight, the poet ſhould have a particular attention to that effect, ſhould be ſkilled in the arts of the theatre, ſhould know how to introduce combats, ballets, feaſts, games, pompous entries, ſolemn proceſſions, and [illegible] incidents as occur in the heavens, upon earth, in the ſea, and even in the infernal regions: but all theſe matters demand a ſtrong diſcernment, and the utmoſt [illegible] in the execution: for otherwiſe, the comic being a near neighbour to the ſublime, they will eaſily become ridiculous. The unity of [illegible] in [illegible] principal [illegible] it would be [illegible] monſtrous chaos. It is impoſſible, however, [illegible] louſly to obſerve the unity of time and place: though the liberty, which reaſon allows the poet in this reſpect, is not without bounds; and the leſs uſe he makes of it, the more perfect his poem will be. It is not perhaps impoſſible [illegible] to [illegible] that, in changing the decorations, the painter may conſtantly make appear ſome part of the principal decoration which characteriſes the ſituation of the ſcene, as the corner of a palace, at the end of a garden, or ſome avenue that leads to it, &c. But all this is liable to difficulties, and even to exceptions; and the art of the painter muſt concur in ſuch caſe with that of the poet. For the reſt, all the operas of Europe are at leaſt one third too long; eſpecially the Italian. The unity of action requires brevity, and brevity is incompatible with a diverſion that laſts full four hours, and ſometimes longer.

116 [illegible]

They have indeed endeavoured to obviate this inconvenience by dividing an opera into three, and even into five acts; but experience proves, that this diviſion, though judicious, is ſtill not ſufficient to relieve the wearied attention.

Sect. II. *Of Lyric Poetry.*

117 [illegible]

The ode is very ancient, and was probably the firſt [illegible] ſpecies of poetry. It had its ſource, we may ſuppoſe, [illegible] from the heart, and was employed to expreſs, with becoming [illegible] and dignity, the grateful ſenſe man entertained of the bleſſings which daily flowed from God the fountain of all goodneſs: hence their [illegible] hymns, and other devotional compoſitions of the kind.

But in proceſs of time it was employed, not only to praiſe the Almighty for bounties received, but to ſolicit his aid in time of trouble; as is plain from the [illegible] written by King David and others, and collected by the Jewiſh Sanhedrim into the book of Pſalms, to be ſung at their feaſts, feſtivals, and on other ſolemn occaſions. Nor was this practice confined to the Iſraelites only: other nations had their ſongs of praiſe and petitions of this ſort, which they preferred to their deities in time of public proſperity and public calamities, as well as to thoſe heroes who diſtinguiſhed themſelves in arms. Even the American Indians, whoſe notions of religion are extremely confined, have their war ſongs, which they ſing to this day.

118
Its freedom.

It is reaſonable to ſuppoſe that the awful purpoſe to which the ode was applied, gave riſe among the ancients to the cuſtom of invoking the muſes; and that the poets in order to raiſe their ſentiments and language, ſo as to be acceptable to their deities, thought it expedient to ſolicit ſome divine aſſiſtance. Hence poets are ſaid to have been inſpired, and hence an unbounded liberty has been given to the ode; for the lyric poet, fired, as it were, with his ſubject, and borne away on the wings of gratitude, diſdains grammatical niceties and common modes of ſpeech, and often ſoars above rule, though not above reaſon. This freedom, however, conſiſts chiefly in ſudden tranſitions, bold digreſſions, and lofty excurſions. For the ancient poets, and even Pindar, the moſt daring and lofty of them all, has in his ſublimeſt flights, and amidſt all his rapture, preſerved harmony, and often uniformity in his verſification: but ſo great is the variety of his meaſures, that the traces of ſameneſs are in a manner loſt; and this is one of the excellencies for which that poet is admired, and which, though ſeemingly devoid of art, requires ſo much that he has ſeldom been imitated with ſucceſs.

The ancients in their odes indulged ſuch a liberty of fancy, that ſome of their beſt poets not only make bold excurſions and digreſſions, but, having in their flights ſtarted ſome new and noble thought, they frequently purſue it, and never more return to their ſubject. But this looſe kind of ode, which ſeems to reject all method, and in which the poet, having juſt touched upon his ſubject, immediately diverts to another, we ſhould think blameable, were it lawful to call in queſtion the authority of thoſe great men who were our preceptors in this art. We may venture to affirm, however, that theſe compoſitions ſtand in no degree of compariſon with other odes of theirs; in which, after wandering from the ſubject in purſuit of new ideas ariſing from ſome of its adjuncts, and ranging wantonly, as it were, through a variety of matter, the poet is from ſome other circumſtance led naturally to his ſubject again; and, like a bee, having collected the eſſence of many different flowers, returns home, and unites them all in one uniform pleaſing ſweet.

119
The ſubjects of the ode.

The ode among the ancients ſignified no more than a ſong: but with the moderns, the ode and the ſong are conſidered as different compoſitions; the ode being uſually employed in grave and lofty ſubjects, and ſeldom ſung but on ſolemn occaſions.

The ſubjects moſt proper for the ode and ſong, Horace has pointed out in a few elegant lines.

Gods, heroes, conquerors, *Olympic* crowns,
Love's pleaſing cares, and the free joys of wine,
Are proper ſubjects for the lyric ſong.

To which we may add, that happineſs, the pleaſures of a rural life, and ſuch parts of morality as afford leſſons for the promotion of our felicity, and reflections on the conduct of life, are equally ſuitable to the ode. This both *Pindar* and *Horace* were ſo ſenſible of, that many of their odes are ſeaſoned with theſe moral ſentences and reflections.

But who can number ev'ry ſandy grain
Waſh'd by *Sicilia's* hoarſe-reſounding main?
Or who can *Theron's* gen'rous works expreſs,
And tell how many hearts his bounteous virtues bleſs?
Ode to THERON.

And in another Olympic ode, inſcribed by the ſame poet to Diagoras of Rhodes (and in ſuch eſteem, that it was depoſited in the temple of Minerva, written in letters of gold), Pindar, after exalting them to the ſkies, concludes with this leſſon in life:

Yet as the gales of fortune various blow,
  To-day tempeſtuous, and to-morrow fair,
Due bounds, ye Rhodians, let your tranſports know;
  Perhaps to-morrow comes a ſtorm of care.
Weſt's PINDAR.

  The man reſolv'd and ſteady to his truſt,
Inflexible to ill, and obſtinately juſt,
May the rude rabble's inſolence deſpiſe,
Their ſenſeleſs clamours and tumultuous cries;
The tyrant's fierceneſs he beguiles,
And the ſtern brow and the harſh voice defies.
And with ſuperior greatneſs ſmiles.
  Not the rough whirlwind, that deforms
Adria's black gulf, and vexes it with ſtorms,
The ſtubborn virtue of his ſoul can move;
Nor the red arm of angry Jove,
That flings the thunder from the ſky,
And gives it rage to roar, and ſtrength to fly.
Should the whole frame of nature round him break,
In ruin and confuſion hurl'd,
He unconcern'd would hear the mighty crack,
And ſtand ſecure amidſt a falling world.
HORACE.

M. Deſpreaux has given us a very beautiful and juſt deſcription of the ode in the following lines.

  L'Ode avec plus d'éclat, & non moins d'énergie
Elevant juſqu'au ciel ſon vol ambitieux,
Entretient dans vers commerce avec les Dieux.
Aux Athletes dans Piſe elle ouvre la barriere,
Chante un vainqueur poudreux au bout de la carriere;
Mene Achille ſanglant au bords du Simoïs
Ou fait flechir l'Eſcaut ſous le joug de Louis.
Tantôt comme une abeille ardente à ſon ouvrage
Elle s'en va de fleurs dèpouiller le rivage:
Elle peint les feſtins, les danſes & les ris,
Vante un baiſer cueilli ſur les levres d'Iris,
Qui mollement réſiſte & par un doux caprice
Quelquefois le refuſe, afin qu'on le raviſſe.
Son ſtyle impetueux ſouvent marche au haſard.
Chez elle un beau deſordre eſt un effet de l'art,
Loin ces rimeurs craintifs, dont l'eſprit phlegmatique
Garde dans ſes fureurs un ordre didactique:
Qui chantant d'un heros les progrès éclatans,
Maigres hiſtoriens, ſuivront l'ordre des temps.
Apollon de ſon feu leur fut toujours avare, &c.

  The lofty ode demands the ſtrongeſt fire,
For there the muſe all Phœbus muſt inſpire:
Mounting to heav'n in her ambitious flight,
Amongſt the gods and heroes takes delight;
Of Piſa's wreſtlers tells the ſinewy force,
And ſings the duſty conqueror's glorious courſe;

To Simois' banks now fierce Achilles ſends,
Beneath the Gallic yoke now Eſcaut bends:
Sometimes ſhe flies, like an induſtrious bee,
And robs the flow'rs by nature's chemiſtry;
Deſcribes the ſhepherds dances, feaſts, and bliſs,
And boaſts from Phillis to ſurpriſe a kiſs,
When gently ſhe reſiſts with feign'd remorſe,
That what ſhe grants may ſeem to be by force.
Her generous ſtyle will oft at random ſtart,
And by a brave diſorder ſhow her art;
Unlike thoſe fearful poets whoſe cold rhyme
In all their raptures keeps exacteſt time,
Who ſing th' illuſtrious hero's mighty praiſe,
Dry journaliſts, by terms of weeks and days;
To theſe, Apollo, thrifty of his fire,
Denies a place in the Pierian choir, &c.

SOAMES.

POETRY *continued in next Volume.*

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